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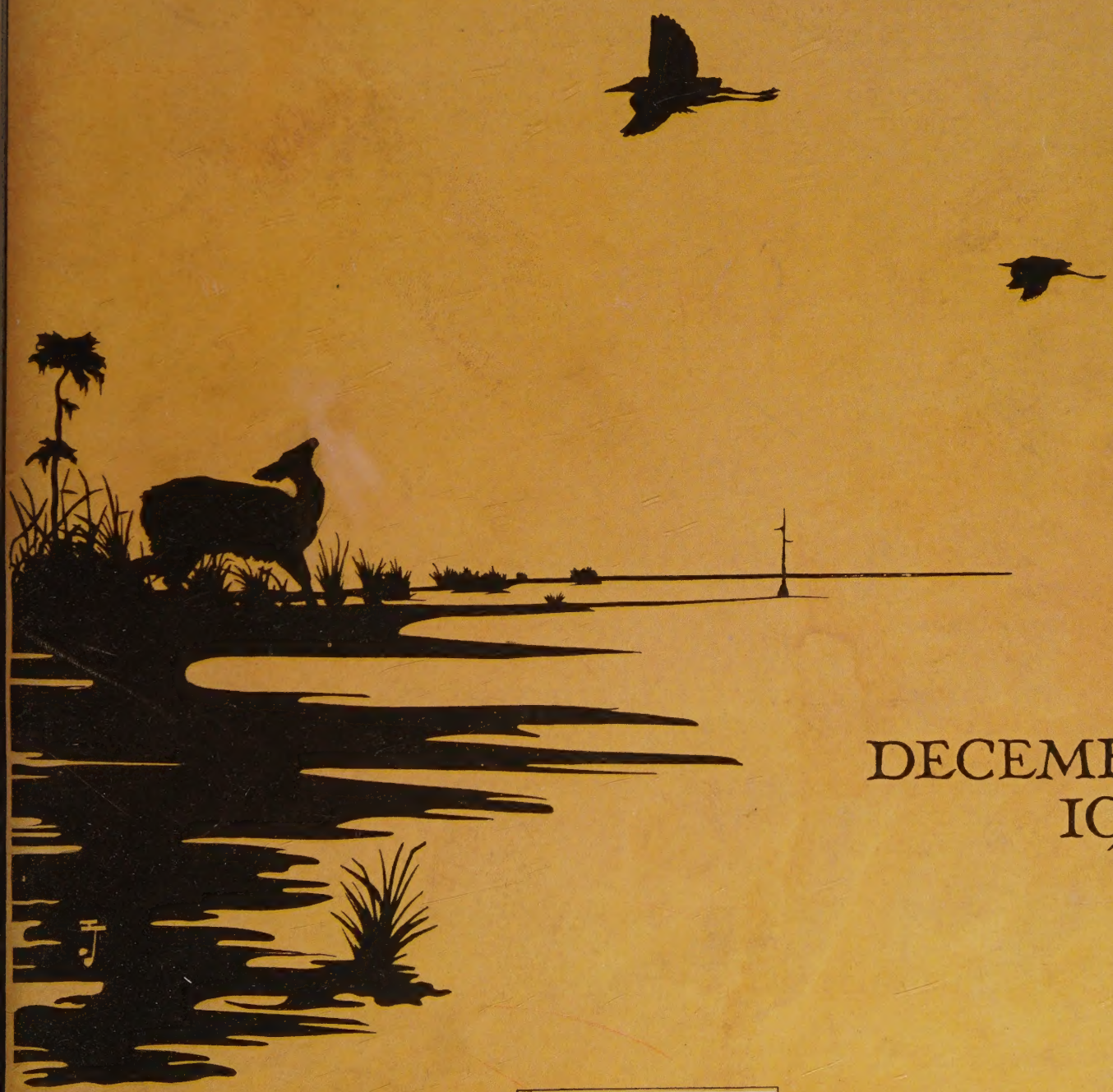

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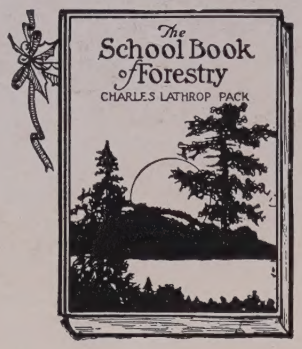

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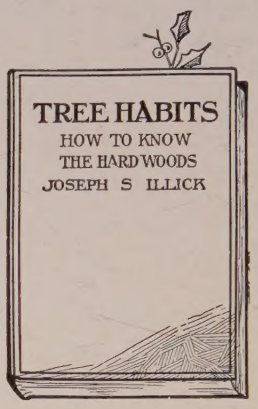

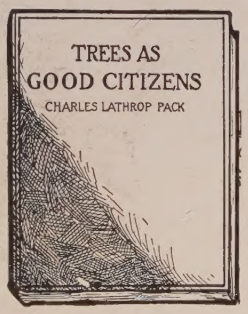

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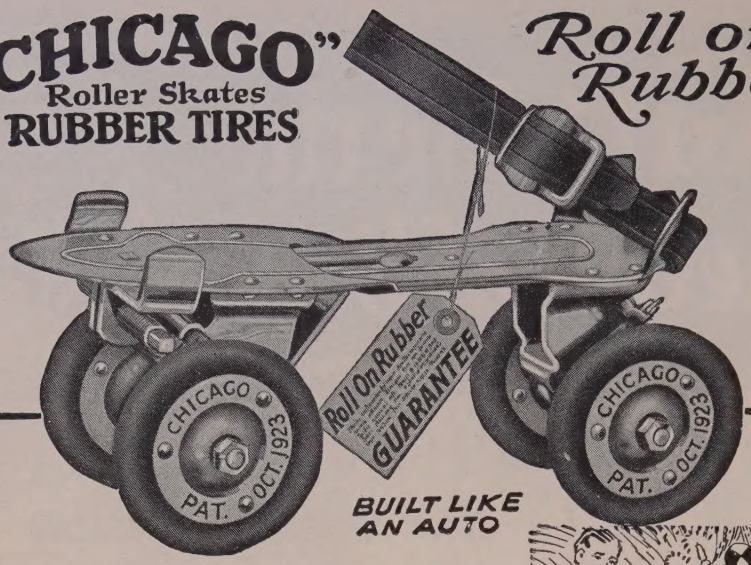

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For All with Aquariums

Of the wide variety of inquiries and requests for advice received in the office of the American Nature Association, perhaps the most outstanding is for suggestions about managing the home aquarium. We have felt ourselves fortunate in being able to refer them to one volume, which is, so to speak, the Aquarium Bible. This book is *Goldfish Varieties and Tropical Aquarium Fishes,* written by William T. Innes and published by Innes and Sons, Philadelphia.

Now comes to hand the ninth and a new edition of this preeminent aquarium book. Mr. Innes, who is a former president of the Aquarium Society of Philadelphia, has revised it in some measure. It is, as were previous editions, profusely and attractively illustrated. The text is simple and interesting reading, whether you have an aquarium or merely wish to read up on aquarium fish. The instruction and advice is as complete, it would seem, as it is possible to make it.

Mr. Innes devotes his first chapter to aquarium management, with particular reference to goldfish. The next four chapters are devoted to goldfish from various viewpoints. The author then proceeds to other aquarium fish, tropical and native; the moot question of fish foods; the enemies and diseases of the fish; terraria, aquatic plants; aquarium construction and appliances; the microscope and the aquarium and the photographing of the fish. The book is admirably indexed, equipped with bibliography and list of illustrations.

Space does not permit the printing of excerpts from the volume by way of review. As a matter of fact, a whole review of the book could be summed up in the statement that we do not see how anyone interested in aquaria or aquarium fish could be without Mr. Innes' work.

Sanctuary! Sanctuary!

This is the title which Dallas Lore Sharp gives to his latest volume fresh from the presses of Harper and Brothers. It is entirely superfluous to say that writings of Nature and out-of-doors from Professor Sharp's pen are charming, delightful and valuable. This latest book of thirteen collected essays adds notably to this naturalist-writer's work.

We were particularly interested to discover that the first chapter—from which the title of the book is taken—deals with William L. Finley and H. T. Bohlman and their fight to have Three-Arch Rocks, off the Oregon coast, set aside as a sanctuary. This fight was carried to the very White

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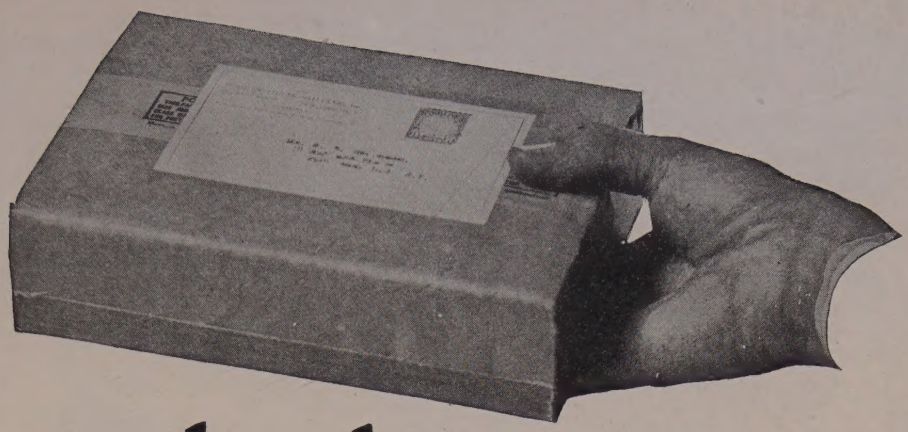

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IF you are a bookish person, you have probably heard about the Book-of-the-Month Club. Many of the most prominent people in the country have already subscribed to its service. Wherever books are talked about, it is likely to come into the conversation. Frequently, however, the simple idea behind it seems to be misunderstood.

There are hundreds of thousands of intelligent people in this country who are really anxious to keep abreast of outstanding new books, as they appear. But the average person *fails to read* most of these important books. He misses them because he is either *too busy* or *too neglectful* to go out and buy them. How often has this happened to you? "I certainly want to read *that* book!" you say to yourself, when you see a review or hear a book praised highly, by someone whose taste you respect. But, in most cases, you never "get around to it."

It is to meet this situation, chiefly, that the Book-of-the-Month Club was organized. It takes cognizance of the procrastination that forever causes you to miss the best books; *each month, without effort on your part, you will receive the outstanding new book published that month—just as you receive a magazine—by mail!*

How is the "outstanding" book each month chosen? How may you be sure it is a book that you would care to purchase anyway? In order to obtain a completely unbiassed selection, the Book-of-the-Month Club has asked a group of well-known critics, whose judgment as to books and whose catholicity of taste have long been known to the public, to act as a Selecting Committee. They are: Henry Seidel Canby, Chairman; Heywood Broun, Dorothy Canfield, Christopher Morley and William Allen White.

These individuals have no business connection with the Book-of-the-Month Club. They were simply requested to function as judges, for the benefit of our subscribers, and they agreed to do so. Each month, the new books, *of all publishers*, are presented to them. From these, by a system of voting, they choose what they consider to be the most outstanding and readable book each month, *and that book is forthwith sent to every subscriber of the Book-of-the-Month Club.*

Tastes differ, however. You may concede that a book selected by such a committee is *likely* to be one that you would not care to miss reading. But you may disagree with their choice in any one month. If so, *you may exchange the book you receive for any one of a number of other books which the Committee simultaneously recommends.* Thus, your choice among current books is no more limited than if you browsed in a bookstore. The only result is—that you actually *do* obtain and *do* read the books you want to read. This you won't do, in most cases, if you rely upon your present haphazard methods of book-buying.

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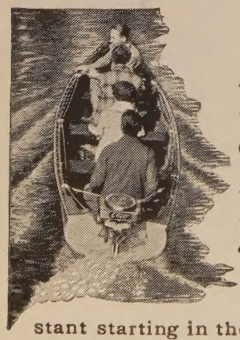

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Another Biology Text

Born of memories of boyhood interest in the out-of-doors, and happy experiences during thirteen summers in camps instructing in Nature lore some ten thousand young people of high school age, "An Introduction to Biology," written by Alfred C. Kinsey, Associate Professor of Zoology and Waterman Research Associate at Indiana University, sees the light of day. It is needless to say that the author's hope to arouse the native curiosity and wide-eyed enthusiasm of the average boy and girl, as expressed in the preface to the book, is sure of realization. In fact the whole subject is treated in so original and fascinating a manner as to make it not only a valuable textbook for those of a high school age, but of absorbing interest to those of an older generation. Scientifically accurate, yet written in a popular and understandable manner and profusely illustrated, it will be found a most excellent investment for either the school or the home library. J. B. Lippincott, Philadelphia, are the publishers.

Ovis poli, and So Forth

We will wager that by and large the American people learned at least two new words during the last year and those words were Ovis poli, the giant mountain sheep that the Roosevelts sought in the Himalayas. Charles Scribner's Sons take obvious recognition of this public education by reproducing the head and curved horns of this beast on the outside of the book *East of the Sun and West of the Moon,* between the covers of which Theodore and Kermit Roosevelt have recorded the story of their trip, made through the cooperation of the Field Museum of Natural History and Mr. James Simpson.

Most of us must take our adventure second hand and here is one of the rare chances to do just this thing in fine style. The authors have written their story in simple, unembroidered narrative and illustrated it with some remarkable pictures taken by Kermit. Even if space permitted we would not feel that it was useful to present a résumé of the volume. Its general outlines are quite well known to the public. All we feel that there is necessary to say is don't miss it. The price is three and one-half well spent dollars.

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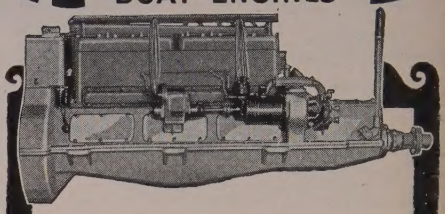

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Our National Forests

We hope that *Our National Forests,* written by Richard H. D. Boerker and published by Macmillan, will receive a wide distribution. We hope the same thing for every good book which presents the facts of our forestry problem, which is going to be solved only by public education and cooperation. In this volume the author has presented a short and popular account of the work of the United States Forest Service with our National Forests—the 155,000,000 acres of our common forest possession. It is a valuable volume for school reference and outside reading work and should find various useful locations where it will serve to add to the sum total of public appreciation of the issue. The price is $2.50.

Beach and Ocean

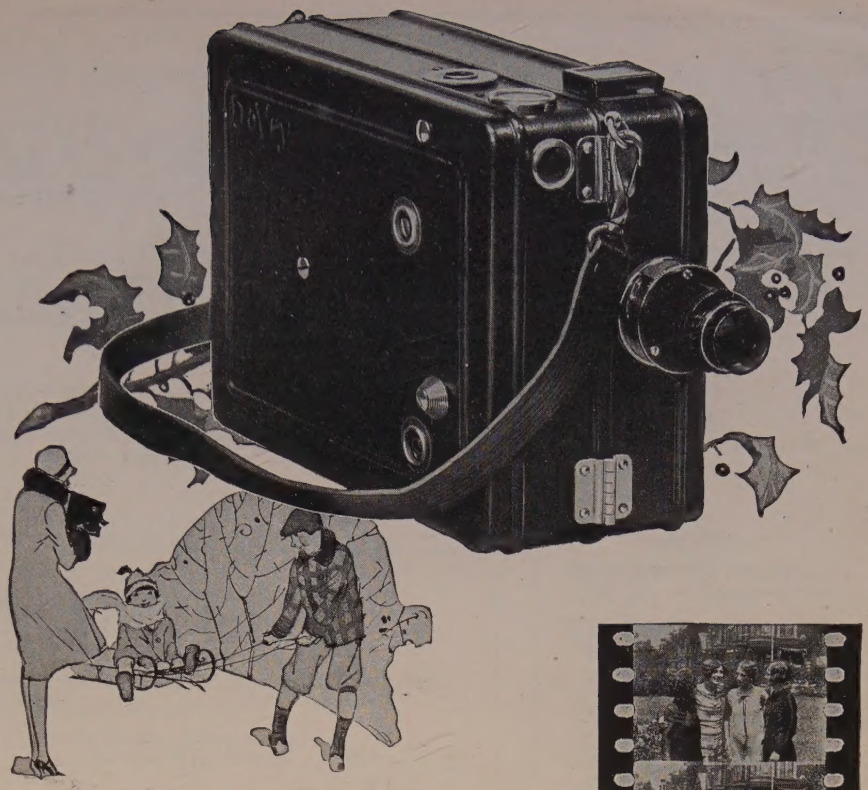
"Children of the Tide," a book of beach and ocean wonders, by Daniel Henderson, is an entertainingly written volume filled with stories about a great many familiar and unfamiliar fish, crustacea, and other animals, which live in the water and on the shore. It has many illustrations and is sure to prove popular with the little folks. It is published by D. Appleton and Company, New York. Price, $1.50.

Avocado Raising

The increasing popularity of the avocado throughout the country, and the high prices willingly paid by people who have acquired a liking for the delectable salad made from this sub-tropical fruit, is attracting the attention of fruit growers in the warmer sections of the United States to its cultivation. To such persons the Department of Agriculture Circular 387-C will prove of much interest. It calls attention to the fact that the avocado has two sets of flowers, which have definite periods of opening and closing, the pollen-bearing and the receptive flowers opening at different times, thus rendering pollination within the same variety difficult. The department advises mixed planting in order to effect cross-pollination. This circular may be secured from the U. S. Department of Agriculture until the supply is exhausted.

New York Trees

The quarterly publication of the New York State College of Forestry at Syracuse University, "Technical Publication No. 15," covers the subject, "Trees of New York State Native and Naturalized," in a comprehensive manner. No claim is made that this publication covers a new field, its object being, as stated by the author, Dr. H. P. Brown, Professor of Wood Technology, to meet a definite demand for such information by the general public, many of the manuals in existence being inaccessible because of the cost, or of such a technical nature as to render them difficult of interpretation.



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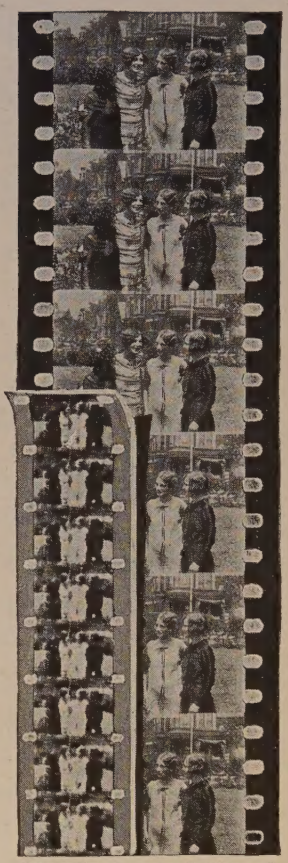

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Nature Calendar

PROVISO TOWNSHIP HIGH SCHOOL LIBRARY MAYWOOD

DECEMBER

Christmas dinner suggestions for bird lunch counters are mixtures of grains, corn kernels, sunflower seeds, weed seeds and plenty of suet.

Do the fruit trees a good turn by collecting and burning all the tent-caterpillar eggs you can find, or collect and serve them at your bird feeding station.

> Blind wind of the night,
> Raging, careering,
> Shriek to me through the keyhole,
> Shout to me down the chimney,
> Whistle and moan through the pinewood out of sight.
> Bring Christmas here,
> The log on the hearth,
> The cattle in stall.
> Pile by the housedoor
> The snowdrift, untroubled
> Put ice on the wall.
>
> —John Gould Fletcher.

Every time the weed-stalks bow in the wind a fresh feast is spread for the "seed-eaters," the finches, sparrows, buntings and cardinals.

Watch your vacant lot for birds with white wing-bars and a dark spot on their gray breasts—the tree sparrows. It is estimated that in Iowa, in one winter, these birds devoured 875 tons of weed seeds.

Nuthatches and brown creepers continue their bark cleaning throughout the winter. These two workers use opposite methods; the nuthatch stands on his head and hops down the tree while the creeper stands on his tail and hops up.

Ruffed grouse and ptarmigan survive the winter by eating frozen buds.

Herring gulls, often as common on the shores in winter as English sparrows in city streets, bob and rock like tiny boats on the white caps of the great lakes.

Which two toes of the crow are closest together? Watch for his tracks in the snow. Find the marks which tell you that he flew away.

Was the rabbit whose tracks you saw in the snow right or left handed? That is, did his right or left fore paw lead as he ran? But first can you tell which way he was running? Notice the imprint of his toes and the difference in size between his fore and hind feet and solve the puzzle of his method of jumping.

The jumping mouse or chipmunk may be sleeping two feet or more beneath the stump upon which you sit to rest.

Young Cecropia moths winter in cocoons. These may be gathered and kept until the moths come out. It is best to hang them up out of doors. If kept inside, they must be moistened frequently.

The homes of paper wasps, first paper makers in the country, can be collected now with safety. Each cell in the house may have been the nursery of several generations of wasps?

Much of the shrew's winter diet consists of insects found sleeping among the dead leaves on the ground.

Dead leaves distinguish the squirrel's nest from the crow's, both plainly visible in high tree crotches. If you look closely at the squirrel's nest, you will find it has a roof in the air.

Many a house top is wearing a small glacier. Pulled by gravity, the little mass of snow and ice moves slowly down the gable. It is carrying with it sand and pebbles scraped from the tar paper shingles. These will be deposited in the eave trough as a small terminal moraine.

Sunset colors become more brilliant as cold weather lessens the humidity in the air.

Sunrise and sunset come closest together on December 21, shortest day in the year in the northern hemisphere.

Although we have no evidence that the Star of Bethlehem still exists, it is supposed to be a variable star appearing at intervals of three or four centuries. Perhaps some Christmas time it will again return and dazzle us with its brilliance.

The man in the moon, the lady with flowing tresses, Jack and Jill with their pail between them are all to be found on the face of the full moon, Sunday evening, December 19.

Prepared for Nature Magazine by the Cleveland Museum of Natural History.

GIVING A THOUGHT TO THE BIRDS IN WINTER

PHOTOGRAPH BY H. ARMSTRONG ROBERTS

Whether the bird house is vacant for the winter or tenanted by some hardy bird, these youngsters have thoughtfully brought a meal through a snow-covered land.

NATURE MAGAZINE

A. BRUCE HORSFALL

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Unwarmed by any sunset light
The gray day darkened into night,
A night made hoary with the swarm
And whirl-dance of the blinding storm,
As zigzag, wavering to and fro,
Crossed and recrossed the winged snow;
And ere the early bedtime came
The white drift piled the window-frame,
And through the glass the clothes-line posts
Looked in like tall and sheeted ghosts.
—WHITTIER.

RUNNING A BIRD HOTEL

By LAURA FENNER

"CHICK-A-DEE-DEE-DEE" is the sweet little song I hear outside my window, and I know that tiny chickadee has come for his breakfast. The weather may be zero, and the wind blowing so hard that the diminutive bird can scarcely keep his footing while he eats, but his song is cheerful and full of promise of warmer days that are to come.

Feeding the winter birds is the most interesting occupation I ever undertook — so interesting, in fact, that housekeeping tasks are often neglected. But who could sweep and dust while Mr. and Mrs. Redhead Woodpecker were pecking at suet nailed to a tree only four feet from a window? And who could peel potatoes or iron when four or five nuthatches were bobbing about on the feeding shelf just outside the window, picking up bits of cracked corn and pieces of suet and then flitting away again?

My bird hotel is simply an extension on the window sill — a shelf about a foot wide, around which runs a narrow edging to keep the food from being easily pushed off. There are two south windows, and at another is a small platform, about two feet away from the pane, where the diners' pictures can be taken as they peck away.

The first day the hotel opens there are a number of guests, and they keep increasing as the days go by. It is a most popular hostelry. The menu is varied, including chopped suet, cracked corn as well as whole grains, wheat and cracked nuts. On all the nearby trees are private dining-rooms where suet is served. This service appeals to the woodpeckers, who come in interesting variety. Bones from roasts and boiling pieces are also welcomed by the winter birds, the bones tied securely to branches of trees, and every vestige of marrow, meat and fat is picked off.

Every year the American Nature Association earnestly urges its members in the northern climes to spread the word of feeding the winter birds. When the snow covers the fields and most of the ordinary sources of food are buried, then is our feathered friends' hardest time. We have chosen as the story to carry the message of winter bird feeding this year, the simple personal experience of a bird lover in a small Ohio community. Mrs. Fenner attempts no literary heights, but in her story of her feeding station emphasizes the joy that there is in running a bird cafeteria in winter.

THE BLUE JAY COMES TO DINE

A photograph of one of her guests taken by the author, happy owner of a popular bird hostelry.

Little downy woodpecker, with his gray and black cap trimmed in bright red, gray and black-barred wings and gray breast, can be heard throughout the winter day. "Penk," "penk," he sounds out, as he skips about the trees looking for his dinner hidden in the bark. He does all he can, as do other members of his large family, to rid our trees of injurious larvae and insects.

The hairy woodpecker, marked quite like his cousin Downy, is interesting also. He lands with a loud "penk!" on

the feeding shelf and at once proceeds to dine. So fast is his attack on the suet that it sounds like a busy telegraph instrument. His legs spread farther and farther apart as he becomes absorbed with his meal, and sometimes he will almost upset backward he gets so out of balance.

All other birds fly away when Mr. and Mrs. Blue Jay come to dine. "Yum! yum! look at this fresh suet, my dear," Mr. Jay seems to address his beautiful wife. He then falls to immediately, picking up numerous chunks and trying to swallow the whole with one gulp. This invariably sticks in his throat and occasions much gasping and craning of his neck before the cargo passes on down. The jay has not the best of reputations, but I shall not expose him here, for in spite of his shortcomings I truly love him. I know of no other sound that brings up more pleasant memories than his noisy song. There are many jay boarders, and I never get tired watching their antics. Why long for picture shows and operas when right here under my very nose is a continuous performance, staged by Nature, and enacted by many of her subjects.

PHOTOGRAPH FRANK BOND

"CT, CT, CT," SAYS THE CARDINAL

He will dart down for grains of corn and carry them away to crack in his strong beak.

winds of winter. It is hard at first to distinguish him, for the clusters of red berries and he are exactly the same color. Perhaps that is why he likes them. He turns his beautifully crested head sidewise, and with a berry disappearing into his orange-yellow beak he addresses his wife, who is also breakfasting a few feet below him: "Berries rather frosty this morning, sweetheart," he seems to say; "let's sample that piece of suet tied over there to that vine." "Ct," "ct," "ct," "ct," it is that way all through the meal; they never seem to run short of conversation.

The female cardinal, while not as brightly colored as her mate, is, nevertheless, a beautiful creature. Usually, these birds will not sit on the feeding shelf to dine but will dart down for grains of corn which they carry away and crack to bits in their strong beaks.

The nuthatches are especially numerous, tripping up and down the tree trunks as easily as though they were on level ground. They are never still a minute, these trim birds. One hears them on the feeding shelf; pick, pick, pick, as the cracked corn is gathered up; patter, patter as they scamper about. They literally eat "on the run." Frequently, they will dart down for grains of corn which they carry to a limb of a tree, and, placing a foot on the corn to hold it down, break the kernels with their beaks. One day I saw a nuthatch running up the side of a tree, while another one came running down. The one below had a grain of corn which it held out, and the other one was not slow to accept the gift.

The large red-bellied woodpeckers with their barred backs are the boldest of all the birds. One will hang calmly on a tree four feet from the window and peck at suet, while I stand near to watch. He will turn his beady eyes toward me with a look that seems to say: "Well, I can stare, too; I'm not afraid of you," then resume his eating with utmost unconcern. Large mouthfuls come loose under the persistence of his peck, peck, peck; mouthfuls that have to be assisted the length of his long beak by the tree trunk, along which he runs his bill until the delicious morsel disappears from sight.

The pair of cardinals that come every morning are the brightest spots in the whole day. "Ct," "ct," "ct," I hear coming from the direction of the porch. I tiptoe to the dining-room window, and there he sits in all his glorious beauty among the bittersweet vines, breakfasting on berries that have withstood the

PHOTOGRAPH BY CORDELIA STANWOOD

CHICKADEE WITH LITTLE BLACK CAP

They eat with a cheery chirping that is ample payment for their meal check.

The nuthatch does not like the English sparrow and will generally win out in a fight. "Yank," "yank," he will say in his nasal tone, and fly at the offending sparrow as though he would truly yank out all his feathers. Away the sparrow scurries, while the bold nuthatch darts upon him with open wings and frightens him dreadfully—for a minute or two; then he comes pestering around again.

Neither do the large woodpeckers, with barred backs and

red heads, like the sparrows. A red head will sit on the feeding shelf pecking away, while numerous excited sparrows gather around to watch the meal. She stands it just as long as she can, then with her beak wide open she pokes her head at them. She never attempts to peck them, which would seem the effective way to rout them. Perhaps she wants to leave the impression that she "eats 'em alive," but no impression seems to be made, for in a little while the inquisitive birds have returned.

The little bluish-gray tufted titmouse I see only when the day is very cold and snowy. Where he keeps himself at other times I do not know, but he must have a supply of food sufficient for his needs when the snow does not cover it. When the white flakes are coming down thick and fast, then I see him seated on the edge of the shelf, chirping his thanks as he dines. I can think of him only as a snow bird.

Cracked nuts make a wonderful hit with the winter birds. Some carry the shells away and pick out the kernels in the tree tops, while others sit on the shelf and calmly pick the meats out, leaving an array of empty shells.

The chickadee, with his little black cap and gray-and-black coat, will sit on the shelf and eat his ration of suet. How he loves it, and how thankful he is for it, for as he eats his cheery chirping comes in to me, which is the heartiest and most welcome thanks he could offer.

Even the English sparrow, whose reputation is none too good, is nevertheless an interesting bird to watch. One sees him, demurely taking his dinner, and wonders if all the stories of his misdemeanors are true. I thought, of course, that the sparrows would take advantage of the hotel and eat me out of house and home. Strange to say, it was nearly a week before any of these little brown birds came to dine, and never have they made a great nuisance of themselves. They seem to prefer eating the "crumbs" which fall to the ground when the other birds are at dinner, or fragments the wind blows off. Sometimes a chunk of suet will fall to the ground, and one lucky sparrow gets it. Not lucky for long, for soon his whole family is after him.

PHOTO L. W. BROWNELL

THE DEMURE QUAIL COME TOO

When the ground is uncovered they take their dust baths in the yard.

He does not fly away, as one might think, but hops hither and thither through the snow, the sparrow army after him. In the end the morsel is usually dropped in the snow in the excitement and lost to all of them.

The demure little quail that come many times during the day, to feed under the two cherry trees in the yard, are by no means the least interesting guests. One covey of nine comes most frequently. Back and forth they run between the two trees, until, on snowy days a path is worn. When snow has fallen on the grain I have placed for them, the quail will scratch it away, exactly as a chicken scratches. How the snow flies under those energetic little feet, and what pleased little chuckles they utter as the wheat comes to light. There is another band of twenty-seven, of which I am very proud, but they do not come as often as the nine. When the weather is mild, and the road in front of the house is dry, the quail take their dust baths. When the twenty-seven take their dusting, it is a sight to behold. They get close together in groups, and the stunts they go through bring tears of merriment to the eyes of watchers. They all but stand on their heads, so thorough is the bath.

THE HAIRY WOODPECKER ARRIVES

He sounds like a busy telegraph instrument as he busily attacks the suet.

Running a cafeteria for the birds might not seem such a profitable occupation to those who count returns only in terms of dollars and cents. But they who have this viewpoint know nothing of the satisfaction that comes from aiding these little woods friends to get through the winter. The sight of their bright eager ways, and the sound of their cheery voices is better than any money reward.

As the warmer days of spring come, my feathered friends dine not so often outside my windows, for Nature is opening her dining-room, and I cannot compete with the delicacies she has to offer. But I keep my lunch stand open, and my old friends drop in for a bite now and then.

I might now go back to my neglected housework, but again there is a drawback. Who wants to do work of any kind when the robins, the meadowlarks and all the rest of the summer birds have returned from the south, to make morning, noon and night one grand song? It is Heaven here then, and who works in Heaven?

Mr. Shepheard-Walwyn has attracted many admirers through his Harmonies of Nature series, of which this article is the last in the first group. Our readers will be pleased to learn, however, that we have made arrangement with this distinguished British naturalist-writer for stories to appear during the coming year.

HARMONIES OF NATURE—TOUCH

By H. W. Shepheard-Walwyn

(ILLUSTRATED BY R. BRUCE HORSFALL)

IN THIS mysterious faculty which we call the Sense of Touch is provided a subject of peculiar interest—if only for the fact that it admits of an element entirely beyond the range of any member of the lower animal creation. The element of—Soul. We are bidden to believe that there is a sixth sense amongst the lower animals. Some would have it that there are even seven. For all we know, there may be eight—nine—ten—twenty. Would anything be too hard to believe, when viewed beside some of the amazing facts which the investigations of Science are continually putting upon record? Would you have ever believed it possible, for instance, that a ridiculous little atom like an ant could actually recognize a relation from whom it had been parted for two solid years? Would you have believed it possible that a bat can actually *feel* the presence of an object seven or eight inches beyond the extremity of its wings? *That* seems to take a little digesting!

Well, then, let them possess their six—seven—eight—or even twenty senses. They have got to have something, poor things, to make up for the lack of Reason—Soul, in other words! The one thing, that is, which puts this sense of Touch upon a plane that must ever remain a closed book to the members of the lower animal kingdom. You have probably guessed what I am leading up to. Personal Magnetism. The touch of the Soul, in other words. The touch of one soul radiating waves of attraction towards its fellow-souls. It is a very mysterious faculty—but none the less real for all that. If the lower animals are to be credited with a sixth sense, I think we might well describe this as the sixth sense among humans—unless we put it in its proper place and call it the first! Naturally the degree of this faculty—even as that of all the other senses—varies enormously in different individuals. Some men and women possess about as much personal magnetism as a turnip, others positively tingle with it from head to foot. There is no doubt that many public characters in the history of the world have attained their positions far more through the agency of this subconscious force than from any outstanding preeminence in the brain department.

It is all done by the Harmony of Touch—the touch of the soul, if not of the body. Now and again we may come across an individual who seems to possess a quite abnormal influence over animals. Domestic creatures appear to love such a person without being asked to—some people may ask an animal ever so many times to love them without meeting with the least response! Not long ago the newspapers produced photographs of a girl who must evidently possess this so-called "way with animals" to an almost uncanny degree. Apparently she can do as she pleases with some of the most difficult customers at the zoological gardens. If she cannot literally twist the big hippopotamus round her little finger, she certainly orders him about like a schoolboy; caresses eagles and leopards with evident pleasure to both parties concerned, and has actually prevailed upon that most intractable of animals, the fox, to submit to the operation—rather tactless in the present case, don't you think?—of being wound about her neck to impersonate a fur stole!

Many years ago, I had the privilege of knowing a strange old hermit who possessed this power to an extent that must have been almost unique. Not only would wild rabbits, squirrels, and birds of various kinds run all over him in the ramshackle wilderness that he called a garden, but even butterflies would come and alight upon his shoulder without any apparent encouragement, while, as for bees and wasps—a peculiarly evil-looking specimen of the latter was crawling over his finger when I saw him one day—yet one felt instinctively that the creature would sooner have stung itself to death than have betrayed the trust of the sympathetic soul, whose touch had so undoubtedly made itself felt through the medium of that wrinkled old hand.

But we must pass on to consider the question in its purely physical aspect. Proof enough of the importance of this

"IN A VERY ECSTASY OF ANTICIPATION"

sense of Touch from the subjective point of view is shown by the manner in which it can be developed in the case of blind persons until one almost wonders whether they have eyes in the tips of their fingers. Then there is the other side.

"Oh, don't touch me—I feel all on edge today!"

There must be few who have not experienced that feeling at one time or another. Nevertheless, it would be difficult to arrive at the precise reason why one should feel at some particular moment, that one would infinitely prefer to be hung, drawn and quartered than—touched! Occasionally the weather may account for it—that time-honored scape-goat for so many of the ills that flesh is heir to. Mental anxiety is a fertile source; influenza has a good deal to account for, and convalescence is apt to find the best of us a trifle touchy—Touchy—there you are! See how the word has spoken for itself. "Don't touch me!"

It is primarily a cry of fear—subconscious fear that the suggested touch or contact might induce a state of discord in one's being. Does one ever shrink from the thought of harmony? Now look at the question from its objective point of view. Why is it that so many people cannot pass a cat without stopping to stroke it? By no means always does that impulse spring from any extravagant love of animals. Why do we see very young children, in trams and busses, stroking the fur stoles of complete strangers with an expression of unearthly rapture on their faces? Why do you and I positively itch to stroke the peaches in a fruiterer's shop? I know of one tradesman who finds it necessary to keep a small boy stationed permanently in front of his peaches, for the sole purpose of checkmating outbreaks of this disease on the part of those who have no intention of becoming purchasers. And I also knew a man whose young daughter could usually be sure of getting five bob out of him so long as she took the precaution to ruffle his hair sympathetically while she asked for it.

"THE SPIDER IN HIS SLEEPING COMPARTMENT"

To travel down the scale is to gather fresh evidence at every turn of the power exercised by harmony—or discord—in the sense of touch. Why does a cat begin to purr with idiotic glee the instant that she is stroked, even by a stranger? Why does a pig intimate so very clearly that he will give you all he possesses if only you will scratch his back? Why does the worst-tempered parrot usually become civil directly you tickle the back of her neck? And why do many horses become extremely rude if anyone attempts to touch their ears? I once had as pets a pair of African suricates—the most comical little creatures that you could meet in a month of Sundays, as the saying is. Their passion for being stroked amounted to nothing short of a mania. The moment I appeared, down they would both go flat in the sand, gurgling and groaning in a very ecstasy of anticipation. Dead silence instantly followed the first touch of my fingers, and throughout the process both lay with closed eyes, and not a sign of life beyond an occasional spasmodic shiver of ecstasy. Janny, the female, was the more exacting of the two, and when I stopped for an instant one day to scratch my nose, she promptly turned and made her huge teeth meet in my leg.

There is another side of the picture which can hardly be ignored entirely. Have you ever had the opportunity of noticing how a wounded kitten or puppy invariably tries to creep into some corner to die? The poor little thing feels that it must have physical contact with something—even the touch of inanimate substances like the corner between two walls, seems to impart a certain degree of consolation in that lonely hour of the supreme crisis. On the rare occasions that one of my Japanese deer falls ill, she invariably

their way up the stems of other plants, instead of trailing hopelessly along the ground? How is it that the clinging tendrils of clematis, peas or bryony know where to find the support that they require? By way of experiment, I once unclasped one of these tendrils, and shifted the twig round to the other side. Within a very short time that tendril had turned completely round and was hanging on again like a leech to its beloved twig!

Let me introduce to you in conclusion a queer little plant called the "Sundew," which even goes so far as to specialize in this direction. An account of its exploits reads like a tale from the Arabian Nights. Not only does this horrid little plant make a hobby of devouring insects alive, but it employs the sense of touch for the purpose of catching them. Its leaves have been endowed with the power of distilling drops of a gummy liquid, which even the fiercest sunshine proves unable to dissipate. You would hardly think it possible that any fly in his senses could be so easily fooled, but the fact remains that a passing fly seldom continues to pass after having once caught sight of the Sundew's patent booby-trap. For a trap it certainly is, and a booby certainly is he! With a pleasant buzz of anticipation he alights for the supposed banquet. The banquet takes place all right—though not perhaps quite in the sense that he intended. You see, there is no danger-board to warn him that the first touch of his tiny feet will cause that sensitive leaf to curl up automatically round his unlucky little body—and only the mocking faces of the Sundew overhead to witness yet another case of "Little fly, go to heaven!" As a low-down trick, don't you think this is hard to beat?

The Kinkajou

By Edward A. Preble

PHOTOGRAPH INTERNATIONAL

THE RACCOON'S DISTANT COUSIN

"Kink" is gentle and makes a good pet except that he does his prowling by night.

forest, the Kinkajou betrays itself to the nocturnal hunter provided with a lantern by its luminous eyes, which appear like two shining balls of light and often lead to its destruction.

When surprised in the trees it sometimes takes refuge in their cavities and is supposed to have its young in such situations, though little seems to be known of its habits.

On one occasion, many years ago, a traveler on the upper Amazon had the good fortune to observe a troop of these agile creatures, being favored in his observation by a clear moon-lit sky. They came from the deep forest, taking flying leaps from branch to branch, and seeking the fruits of a species of palm which grew close to where the observer was sleeping. A young one, found in the vicinity early the next morning, was kept for some time as a pet. It readily ate bananas and other available foods, and in a short time became tame and showed a marked preference for its master, like any good pet.

A STUDY IN WOOD DUCK NESTS AND NESTING

In the center a "coon's-eye view" of mother duck on her nest; to the left a nest she has left in a hurry without covering the eggs; to the right a nest of eggs she has carefully covered before leaving.

HOW YOUNG WOOD DUCKS LEAVE HOME

By Joseph Dixon

Of the Museum of Vertebrate Zoology, University of California

(PHOTOGRAPHS BY THE AUTHOR)

THE WOOD DUCK is not only beautiful but wise; at least in choice of nest sites. She does not choose the clumps of cattails that grow about the margins of ponds, where marauding animals may easily approach. Instead, she lays her eggs in holes in trees from four to forty feet above the ground. In order to find a cavity suitable for a nest it is sometimes necessary for her to select a tree some distance from the nearest pond or stream. The problem arises, when the eggs hatch: How are the young ducklings going to get out of the nest cavity, which is sometimes three or four feet deep? Having escaped from the hole, how are they to get safely down to the ground without falling and breaking their necks? And finally, having reached the ground intact, how are they to reach the nearest stream or pond?

Some men say that the mother duck flies and carries the ducklings on her back. Others state that the young are carried one at a time in her bill, just as a mother cat carries her kittens. Still others claim that the ducklings scramble out of the nest cavity themselves and fall to the ground or into the water as the case may be. By burrowing into and remaining in the center of a prickly blackberry bush that grew within twelve feet of a nest, the writer was able to watch closely the duck as she entered and left her home, and to discover the real facts of her habits.

In the San Joaquin River Valley, the resident wood ducks forsake the beaver ponds and seek nest sites near farmhouses. Out of a dozen nests observed, ten were near human habitations or beside well-traveled roads. This was not because such nests were most in evidence and hence most readily found, because extended searches were made in the swamps about the beaver ponds and failed to reveal either wood ducks or their nests during the breeding season. It is believed that the chief reasons why wood ducks prefer to nest near human habitations are because they are there protected from natural enemies and because of the presence of suitable nest sites. In protecting his chickens from coyotes and other predatory animals the farmer also often unwittingly protects wood ducks which nest nearby.

The period of incubation is the time of greatest peril for the wood duck. For a period of thirty days the mother and her eggs or helpless young are confined night and day in a narrow cavity. There is only one entrance to the wood duck's home, and often this is so small that the duck can squeeze through only with difficulty. At times eggs are thus cracked by the female squeezing through a narrow entrance, which in one instance measured only three and one-fourth by three and one-half inches.

A study of muddy footprints showed that during the nesting season raccoons habitually climb many of the larger trees, one after another, and investigate the larger cavities.

A NEST IN AN OAK

Mother duck chose a home in a tree beside a busy road.

Experiments showed that a slight scratching at the base of the nest tree, as of some clawed animal climbing, during the day but especially during the night, would cause the brooding wood duck to bolt the nest in haste. With one female it was found that, if one or two persons talked or whistled as they approached the nest, the brooding bird would fly directly away from the nest when flushed. However, if the same person sneaked up quietly to the tree and scratched on the bark the female would drop from the nest directly down into a pool of water beneath the tree and there flop about dragging a "broken wing" and making every effort to divert the attention of the presumed predatory animal.

Out of twelve nests found nine were in natural rotted-out cavities and three were in old flicker holes. The lowest nest was six feet above the ground in a valley oak standing beside a road sixty yards from the nearest water. Another nest was in an old flicker nest fifteen feet above the water. It is significant that ten out of twelve nests examined were directly over water.

During the last of March a mated pair of wood ducks was seen prospecting for a nest in an old gnarled willow that grew near a farmhouse. The drake led in the house hunting, but the final choice was made by the female. Even where the same cavity served as a nest for seven seasons, supposedly by the same pair of ducks, the drake indulged in a certain amount of nest hunting, apparently as a regular part of the courtship. The male was very attentive to his mate during the house-hunting period. It may be that his anxiety to show his bride a nice new home was simply nest-time propaganda.

One pair of wood ducks had a nest full of twelve eggs on April 9, while another pair had ten fresh eggs in their nest on the last day of May. The number of eggs that were found in eight nests varied between ten and fourteen. However, the eggs of wood ducks are frequently infertile or, for other reasons, fail to hatch. Out of ninety-seven eggs which were watched, only fifty-one hatched. Two sets of eggs were partly destroyed by coons, and two other sets were abandoned by the ducks, due to fright. It is probable that in some instances the failure of the eggs to hatch may have been due to the female remaining away from her nest too long after being frightened.

When the duck is on the nest she plucks gray down from her breast and tucks it around the eggs to keep them safe and warm. If she is frightened suddenly from her nest, she leaves the eggs uncovered. But when leaving naturally she first covers them with down. This serves not only as a blanket to keep the eggs warm while she is away but to protect the eggs from the prying eyes of California jays and other natural enemies.

One particular female wood duck is worthy of special mention because of her unusual tameness. This duck had nested year after year in an old willow near the home of a friendly farmer who had protected her. Soon after she began to incubate her eggs the farmer lost a tame duck that "hid out" on a nest full of eggs. One of the farmer's small boys found the wood duck on her nest in the willow. He reached in, picked her up and carried her in triumph to his mother, saying, "Mother, here is the duck that we lost." The mother replied, "Oh, no; that is a wood duck! You must turn her loose so that she can go back to her eggs." This was done, and to everyone's surprise the bird did return to her nest that evening. I later visited this duck. When I reached into the nest and stroked her back with my bare hand she did not seek to escape but uttered a low hissing note and pecked at my fingers. I climbed cautiously up above the nest and, setting up my tripod and camera, secured her picture as she sat on her eggs. During the two-minute exposure which was required because of the depth and darkness of the nest cavity, the only movement that this duck made was occasionally to blink an eye.

MR. COON

He has a fatal liking for wood duck eggs in his diet.

The female often slipped off her nest about six o'clock in the morning to get a bite of breakfast. Returning in about an hour, she spent the entire day on the nest while her mate remained in hiding in their favorite feeding pond. Here she rejoined him for a short period in the evening, first having carefully covered her eggs with soft, warm down. At such times before leaving the nest the duck peered out cautiously to see if the coast was clear. She then squeezed quickly through the narrow entrance and sped swiftly forth. When returning, the duck never flew directly to the nest but always took up a preliminary perch some fifty yards away. After waiting several minutes, she flew to the nest, where she perched flicker fashion at the entrance before scrambling up and into it.

Wood ducks of both sexes escape notice by perching motionless lengthwise of some limb usually in

WOOD DUCK YOUNGSTER

The baby ducks seem born with an expert ability to climb.

shadows. When the threatened danger has passed the ducks often stand erect and are much more in evidence.

In four known instances it was thirty, thirty, thirty-one and thirty-two days from the time the wood ducks began to sit on their eggs until the young were out of the shell. The eggs hatch slowly, twenty-four to forty-eight hours elapsing between the time the first crack appears in the eggs and the final emergence of the young. Sometimes the ducklings lack vigor enough to break through the shell. I doubt if the mother duck helps them in such instances. I assisted some weak ducklings to escape from the eggs but found that "helped" ducklings always lacked vigor and were soon left behind, being unable to keep up with the rest of the brood. When first hatched the young duck is wet and scarcely able to hold up its head. In from two to five hours after hatching, the downy feathers of the ducklings dry and fluff out amazingly. When an intruder approaches a nest full of ducklings of this age they scramble about and dive headlong into the mass of down that lines the nest. Looking into such a nest, a person sees only broken egg shells and a mass of grayish down. If he waits a moment, the ducklings peep forth and tumble about, preening their feathers and pecking at each other's bills. The young do not leave the nest as soon as they are hatched, but remain in it normally from twelve to thirty hours before venturing forth.

THIRTEEN DOWNY LITTLE WOOD DUCKS

This is a normal brood although the number of eggs found in the nests varies from eight to fourteen.

As to the actual manner in which the young get from the nest in the tree into the water, in all three instances where the author watched, the young ducks scrambled out of the nests themselves. In no case was any of them carried out of the nest in the bill or upon the back of the parent. I do not wish to imply that this is never done, because it might be where the nest is high up in the tree and some distance from water. I believe that the usual method is for the young to scramble out by aid of their own legs and wings. Eighty per cent of the wood duck nests that I have found have been directly over water, so that the young ducks could drop from the nest directly into their native element.

The first brood watched left the nest in the morning, accompanied by their mother. She appeared at the entrance behind her offspring, which she seemingly urged along. Arriving at the "jumping-off" place, the ducklings fluttered down one after the other into the water ten feet below. Here they were joined by their mother, who led them off into a near-by tangle of water weed.

The second brood left the nest when twenty-five to twenty-six hours old. In this case the young were called out of the nest by their mother as she swam back and forth near the base of the nest tree. I looked up just in time to see the ducklings come trooping in single file to the entrance of the nest and flutter down, one after the other, through a maze of branches into the water beneath the tree. One youngster fell clear of the limbs, but the drop of ten feet was eased by the use of spread tail and wings, so that the duckling lit on the water as lightly as a ball of cotton. The whole brood was out of the nest and into the water in less than two minutes by my watch. As soon as the ducklings struck the water they dipped their bills into it, fluffed out their feathers and began to paddle about amid the water buttercups.

In the third instance the young ducks did not leave the nest the day they hatched, so I slept beside the nest tree. The mother duck spent the night on the nest, but at seven o'clock the next morning she slipped off for a bite to eat. Later, while both parents were absent, one duckling scrambled to the entrance of the nest, peeping loudly. It peered about for a moment and then sprang with wings and tail spread directly towards the water, which flowed in an irrigation ditch beneath the nest. The first duckling had barely reached the water when it was followed in quick succession by the remainder of the brood, so that the nest was emptied in less than three minutes.

The ability of the young to scramble out of a deep cavity has been questioned. I found that the ducklings were able to climb easily out of the deepest nest cavity. I have even seen them fall over backwards, but so effective are their sharp little claws or toenails that they would hang head downward by one claw and then scramble back to an upright position without falling. This is a display of acrobatic skill that one would not look for in a tiny duckling.

THE COVER THIS MONTH

From the inspired scissors of Joe Cranstoun Jones, the Georgia invalid boy who has imprisoned Nature in his silhouettes, comes the cover for this issue of NATURE MAGAZINE. *During the coming year we will bring out more of Joe Jones' beautiful work.*

The Camera Goes Exploring

By George T. Hillman

NOT FROST ON THE WINDOW

But versatile sodium carbonate making strange designs for microscope and camera.

WITH the Nature lover who tells his story chiefly through the medium of photography, there are times when subjects may seem scarce, especially in the city where so many smoky days are added to the foggy and rainy ones. However, material of unusual interest is sometimes found which on brighter days would not be considered worthy of investigation.

Just such an object of interest was discovered one day when some frost-like deposits were noticed on the rim of the developing tank where the solution had splashed over and dried. A small hand glass revealed a peculiar striate area which might have pictorial value if it could be enlarged.

It was evident that a lens of considerable resolving power would be needed as well as a specially built camera. Having access to a compound microscope in combination with a camera which had a long bellows draw, the next thing to do was to find out which, if not all, of the chemicals in the developing solution were chiefly responsible for general character and eliminate those which left only a meaningless sediment.

To do this a little of each chemical was dissolved in water, spread on glass slides and left for a few minutes for the water to evaporate. As this progressed and a chalky white edge began to appear, one was placed under the microscope. This, happening to be sulphite, left nothing distinctive. Likewise the bromide and elon were discarded with no possibilities, leaving the hydrochinon and carbonate of which numerous slides were made both separately and combined. In all of them the action was almost startling, the water line receding very fast and making it difficult to keep in focus. With hydrochinon which had the appearance

NOR IS IT FUNGUS GROWTH

But a chemical action that offers endless variety to the explorer in photography.

WHAT CAMERA AND MICROSCOPE CAN DO

Pictures like these can be made of an area no larger than one-sixteenth of an inch square.

of long glass needles piled and welded together or scattered profusely in all directions, there was little variety but one never grows tired of watching the clear liquid being transformed into such a wonderful crystal labyrinth.

The alkali, sodium carbonate proved to be the most versatile of all, no two slides ever looked alike, yet most of them suggested some form of plant growth. As I focused the white edge between the already crystallized portion and the solution, numerous spear-shaped points appeared to shoot out into the solution, changing in character and leaf-like whorls started branching off. A dark irregular strip appeared from which another stock branched into a plant of different character and often I felt that there were flowers at the ends of some of the stems. The proportion of chemical and water seemed to have some bearing on the character of the formations, but no way was found by which one could control the action.

To describe with words the marvelous activity and the infinite variety is quite beyond the writer's ability but after some fifty or more of these slides were examined an attempt was made to photograph a few of the typical areas with the accompanying results. An idea of size may be had when we consider that the area shown in the reproduction covers approximately only one-sixteenth of an inch on the original glass slide.

Considering the variety obtained with these few, we wonder what will later be found when some of the many other kinds of crystals are treated in a manner similar to this.

The Silent Cave Cricket

WHILE these efficient-looking insects, with hind legs that look as if they meant business, are generally called stone or cave crickets, they are not crickets at all, but belong to a group called the wingless grasshoppers. All grasshoppers are wingless when young, but these independent creatures feel able to get along without them all their lives. But since grasshoppers sing with their wings, these fellows, by disdaining them, have to go through life voiceless. Being thus unable to communicate with each other in this way, they have less need for hearing than most creatures, and since students of the group have been unable to find that they have ears on their front legs, where all orthodox grasshoppers are supposed to have them, they are presumed to be deaf also. Lack of these abilities, however, does not seem to bother the creatures in the least, nor to interfere with their enjoyment of life.

THE CAVE CRICKET IS NOT A CRICKET

This fellow with business-like legs belongs to a group of wingless grasshoppers and goes through life voiceless

There are a number of species of the genus *Ceutophilus*, but they are all, male and female, more or less similar in color, some shade of yellowish-brown, and differ little in shape. They are rather common in many parts of our country, but as they are nocturnal, and spend the day beneath logs and stones, or in shallow caves, they are seldom observed. We have found numbers beneath old slabs which had long lain among rocks in shady woods, and they sometimes find cellars, or the spaces beneath outbuildings, habitats quite to their liking.

The wingless grasshoppers lay their eggs late in summer or early in autumn, probably in the earth. The eggs sometimes hatch in the fall, but usually not until spring. Like all grasshoppers, the young do not pass through any peculiar larval life, but resemble their parents when first hatched, though they have that pudgy childish appearance common to all young animals.

Though the wingless grasshoppers are not known to prey on other living creatures in a wild state, they are omnivorous in captivity, relishing meat as well as fruit and vegetables, the ordinary food of their relatives.—E. A. P.

A BATTLE IN THE SKY

A display of northern lights as depicted by an imaginative German artist of the sixteenth century.

The Upper Stories of the Atmosphere

By Charles Fitzhugh Talman

BECAUSE man has become the rival of the eagle and the condor in his ability to rise above the loftiest mountains, we hear him boast that he has "conquered the air." That is a flagrant exaggeration. Dwellers on the upper floors of a skyscraper hotel are not bothered by flies. If a fifty-story caravansary for giants towered from the earth to the topmost level of the atmosphere, no windows above the ground floor would need to be screened against the intrusions of aviators and balloonists. Indeed an inmate might take a nap in the lobby with no fear of having his bald spot used as a landing ground. The worst the pesky aeronauts could do would be to tickle his ankles.

The greatest distance any human being has yet been able to put between himself and his native planet is less than eight miles. The atmosphere extends upward some *thousands* of miles. Through the greater part of its vertical extent, however, it contains very little matter. Air, like all gases, is highly compressible. The lowest part of the atmosphere, pressed down by the air above, is relatively dense. With increase of altitude the density falls off so rapidly that at a height of three and a half miles the air is only about half as dense as at sea-level. Above about five miles it is too rare for breathing; hence aerial travelers who go higher must carry a supply of oxygen with them. At the fifty-mile level the atmosphere is, according to calculation, less than one seventy-five-thousandth as dense as at sea-level, and at the three-hundred-mile level about one two-millionth as dense. This is a pretty good vacuum, although far better are produced nowadays in the manufacture of electrical equipment. Even at an altitude of two thousand miles it has been computed that there are still something like 300,000 molecules of atmospheric gases per cubic centimeter (as compared with 30,000,000,000,000,000,000 per cubic centimeter near the earth's surface). Much farther up it is supposed that some of the widely scattered molecules occasionally escape into outer space, though it is believed that, in the course of ages, only an infinitesimal fraction of the atmosphere is lost in this way.

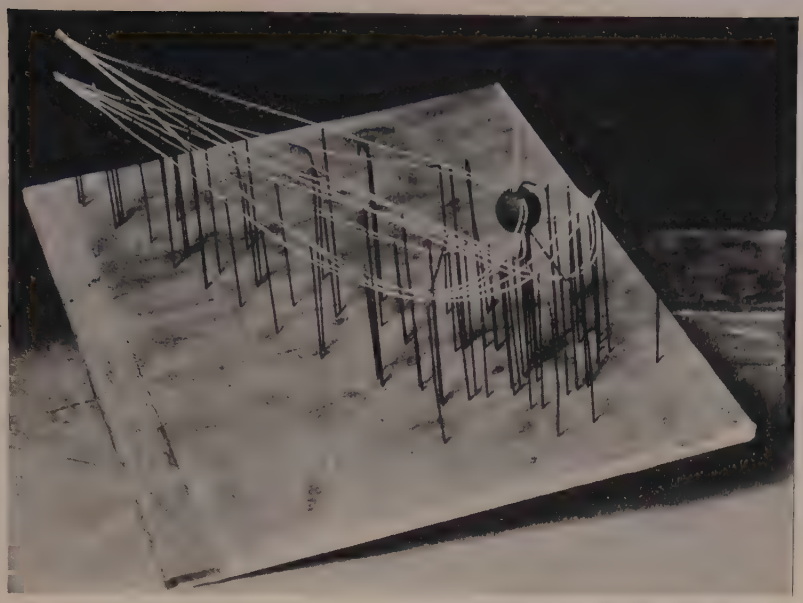
Most of the definite information we now possess regarding the atmosphere at levels far above the earth has been acquired since the beginning of the present century. At an earlier period a good many scientific balloon ascents were made for the purpose of studying conditions aloft, and some inferences concerning these conditions were drawn from observations of clouds, twilight phenomena, meteors and the aurora, but in general meteorologists confined their attention to the atmospheric regions close to the ground. About the year 1900 meteorology became a "science of three dimensions." During the first decade of the twentieth century studies of the atmosphere in a vertical direction began to be made on a world-wide scale, especially by means of newly devised types of kites and balloons. The

PHOTOGRAPH FROM PROF. CARL STÖRMER

SWEEPING GARMENTS OF THE NIGHT

Auroral "draperies" photographed at Bossekop, Norway, February 28, 1910. The curtain-like forms of aurora are rare and striking.

kites were box-shaped, with several miles of steel wire in place of a string, while the balloons were of the two varieties known as *sounding-balloons* and *pilot-balloons*. The sounding-balloon carries up a set of feather-weight self-registering instruments in lieu of a human observer. At a certain height, which can be determined approximately in advance, the balloon bursts, and a parachute or an auxiliary balloon wafts the instruments gently to earth. The pilot-balloon takes up nothing but itself, and serves merely to show, by its drift, the movements of the air at various levels. Both of these types of balloon attain altitudes far beyond the reach of the aeronaut. Heights exceeding twenty miles have been claimed for some of their ascents.



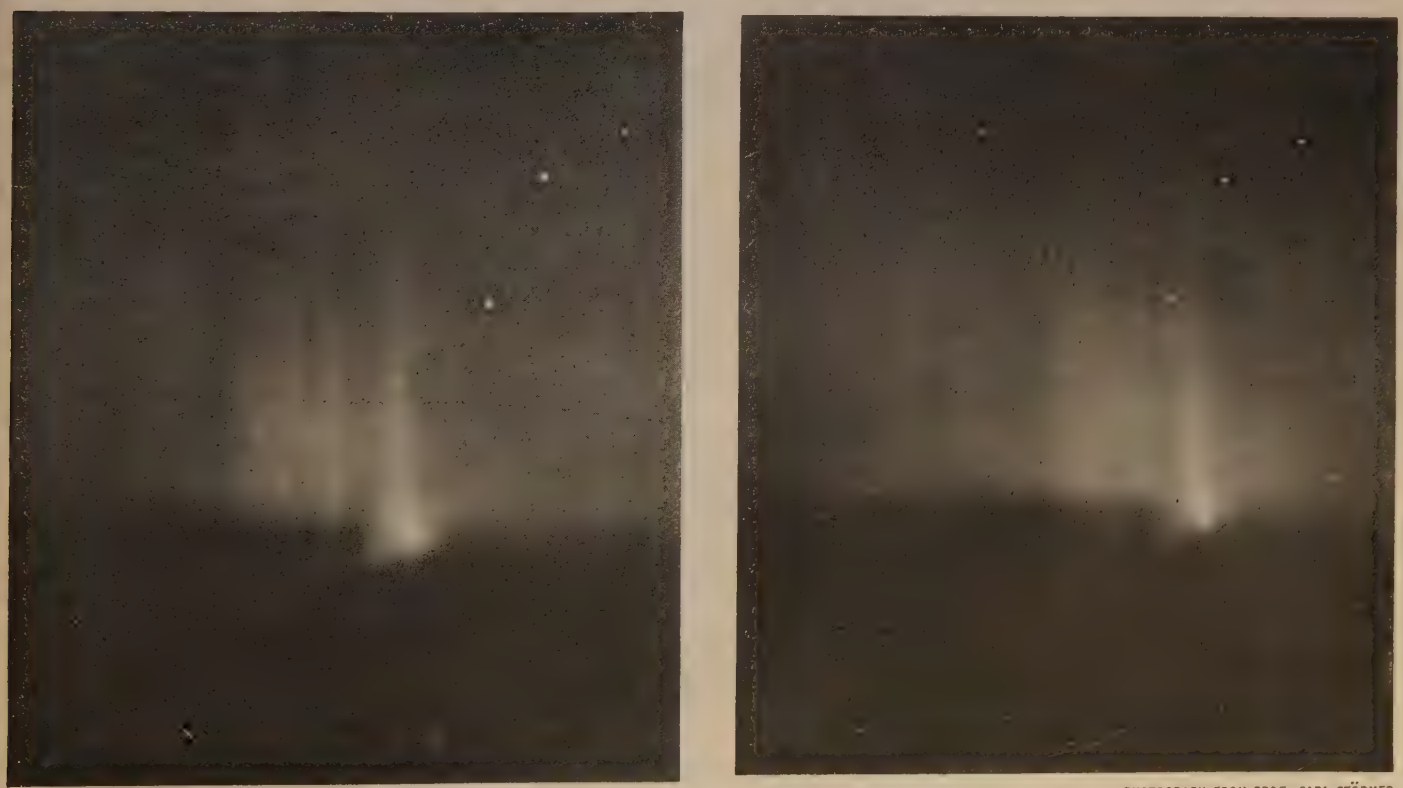
PHOTOGRAPH FROM PROF. CARL STORMER

A MODEL THAT EXPLAINS THE AURORA

Showing how the electrified particles from the sun are deflected from a straight course by the earth's magnetism.

Many phenomena of the high atmosphere can be studied without recourse to these devices. Lofty air currents can be investigated by observations of clouds, of which the highest ice-clouds are sometimes more than ten miles above the earth, while thin clouds of volcanic dust probably occur at much greater heights in some cases. Meteors, or shooting-stars, are visible up to a height of about one hundred miles. The aurora occasionally extends up to a height of more than four hundred miles. The diversity of methods employed in upper-air research is quite remarkable. Attempts have sometimes been made to calculate the density of the atmosphere at high levels from the computed paths of the sound waves attending great explosions. The advent of radiotelegraphy has led to new ideas about the upper atmosphere. The transmission of radio signals around the globe appears to depend upon electrical conditions far aloft. According to the suggestion made some years ago by the English physicist Heaviside, there is a highly conductive layer of the atmosphere at an altitude of fifty or sixty miles, from which the signals are reflected at night, while in the daytime they do not travel so high, because of the "ionization" of the lower atmosphere under the action of sunlight. This is thought to account for the greater range of radio by night than by day. The layer in question has been named the "Heaviside layer."

The most remarkable discovery thus far made about the

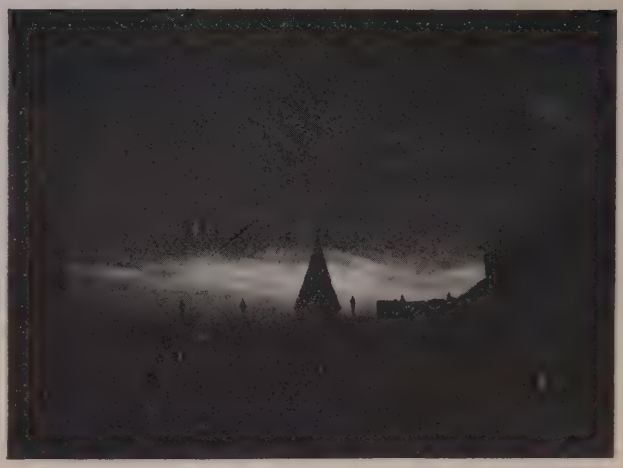


PHOTOGRAPH FROM PROF. CARL STÖRMER

HOW PHOTOGRAPHY LOCATES THE AURORA

Pictures taken simultaneously from two places forty miles apart. Note displacement of the auroral beam with respect to the stars.

upper atmosphere was the result of temperature observations taken with sounding-balloons. It is a matter of common knowledge that the air at great heights is extremely cold. Aeronauts and mountaineers must wear heavy clothing even in midsummer, and the summits of lofty mountains all over the world are mantled in eternal snow. Once it was supposed that the air kept on growing colder with increase of altitude to the very top of the atmosphere. This belief was upset in the year 1902, when a great number of sounding-balloons had been sent up in the neighborhood of Paris by the French meteorologist, M. Teisserenc de Bort. An examination of their records disclosed the fact that in every case, after an altitude of about six and one-half miles was attained, the fall in temperature ceased. In many cases there was actually a slight rise in temperature at higher levels.



PHOTOGRAPH V. MALZEV, LENINGRAD

"NOCTILUCENT" CLOUDS SEEN LATE AT NIGHT

Such clouds may be fifty miles above the earth and probably consist of fine dust.

Meteorologists were quite unprepared for this discovery, and its announcement was received with considerable skepticism. Very soon, however, similar observations were reported in other parts of the world. Now we know that the phenomenon is not local or exceptional, but prevails everywhere. It appears that there is a layer of the atmosphere, just above the level of the higher clouds, in which the temperature is nearly uniform in a vertical direction. This region was at first named the "isothermal layer," but is now generally called the "stratosphere." Its height above the earth varies with a number of conditions, the most important of which is latitude. It is least over the polar regions and greatest over the equator. This fact leads to a curious paradox. The fall of temperature with ascent from the earth extends highest in the equatorial regions. Hence, while in middle latitudes the temperature of the stratosphere averages about sixty-eight degrees below zero, Fahrenheit, much more frigid conditions prevail over the torrid zone. The lowest temperature ever measured anywhere in the atmosphere was one hundred and thirty-three degrees below zero, Fahrenheit, recorded by a sounding-balloon above Batavia, only six degrees from the equator!

The part of the atmosphere below the stratosphere is called the "troposphere," and these two atmospheric layers have been found to differ greatly in other conditions besides temperature, so that they constitute two distinct strata more or less comparable to those in the earth's crust described by geologists. The troposphere enjoys a monopoly of storms and clouds (except dust clouds) and contains nearly all the moisture of the atmosphere. The "weatherless" stratosphere, on the other hand, recalls the poet's description of

> The lucid interspace of world and world,
> Where never creeps a cloud, or moves a wind,
> Nor ever falls the least white star of snow,
> Nor ever lowest roll of thunder moans

except that winds are not altogether lacking in this lofty region. There are winds in the stratosphere, but we do not know much about them.

Whether the air is equally frigid, or more so, at levels far above the part of the stratosphere for which we have thermometer readings is a question concerning which there has been much discussion. The bulk of authority now favors a fairly uniform temperature extending upward to an indefinite height. Two quite different views have, however, been advanced. According to one of them the luminosity of meteors implies decidedly warm weather in the upper atmosphere, while according to the other the spectrum of the aurora indicates the presence, at high levels, of frozen nitrogen, which would mean a temperature lower than three hundred and forty-six degrees Fahrenheit!

The latter idea, recently propounded by Professor L. Vegard, is the result of one of the many attempts that have been made to determine the composition of the high atmosphere by identifying a conspicuous yellowish-green line—the so-called "auroral line"—that is seen whenever the spectroscope is pointed to

NORTHERN LIGHTS

From a painting by Howard Russell Butler, in the American Museum of Natural History, New York.

the aurora, and that may also be observed generally on clear nights even when no visible aurora is present. This line has been variously attributed to krypton, argon, and several other elements, including a hypothetical light gas, unknown to chemists, for which the names "geocoronium" and "zodiacon" were proposed. Recently Messrs. McLennan and Shrum, in experiments made in the laboratory of McGill University, Montreal, found that they could reproduce the line by sending an electrical discharge through oxygen mixed with a certain amount of helium, and they have since reported that it can be produced with oxygen alone. As some of the other lines of the auroral spectrum are due to nitrogen, it now seems likely that the atmosphere at the levels where the aurora prevails consists of oxygen, nitrogen and possibly helium. Higher up, perhaps helium, the lightest of these three gases, predominates, though we have no positive knowledge on this point. Hydrogen, the lightest of all substances, was once thought to be the prevailing gas above a height of about fifty miles, but present evidence seems to show that the minute quantity of this gas found in the atmosphere is confined to low levels.

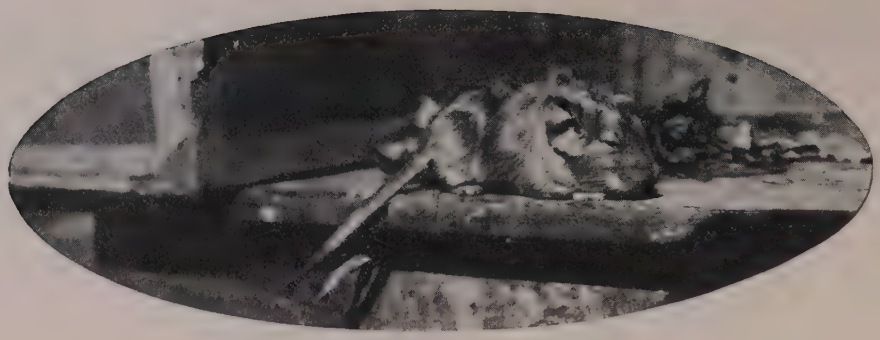
The aurora (known in the northern hemisphere as the "northern lights") is the loftiest visible thing in the earth's atmosphere, and its study constitutes the most romantic chapter in the history of upper-air research. As seen from the northern United States it generally takes the form of a low-lying luminous arch or ill-defined glow over the northern horizon, but occasional displays fill the whole sky with magnificent multicolored beams and curtains, culminating in a gorgeous "corona" or crown south of the zenith. In Canada and northern Europe these brilliant displays are much more common, but still farther north—well within the Arctic Circle—the aurora is of somewhat rarer occurrence and is generally seen *south* of the observer. In other words, there is an irregular belt encircling the Arctic regions in which auroral displays are most frequent, though they occasionally extend far north and south of this location. They have even been seen in the West Indies and northern Africa. These statements apply to the *aurora borealis,* of the northern hemisphere. In the southern hemisphere there is a similar *aurora australis,* having a corresponding distribution in latitude.

Much of the mystery that attached to the aurora a generation or so ago has been dispelled by the general progress of science and especially by the researches of certain Norwegian physicists, who have made a special study of this phenomenon. An auroral display is an electrical discharge in the rarefied gases of the upper atmosphere, very similar to the discharges seen in the Crookes tubes of the laboratory. The cause of the discharge is generally believed to be the bombardment of the atmosphere by some sort of electrified particles coming from the sun. Great auroral displays coincide with the appearance of large or numerous sunspots and other evidences of unusual solar activity. There is also some connection between auroras and magnetic storms, which manifest themselves in the erratic behavior of compass needles and in the occurrence of powerful "earth currents," causing more or less interruption in the telegraph service.

THE AURORA IN MINIATURE

A magnetized iron sphere glowing under an electric discharge. The luminous areas correspond to auroral belts.

The earth is a great magnet, and, like other magnets, it has the property of deflecting from a straight path an electrical discharge occurring in its vicinity. This fact explains why the streams of electrified particles from the sun do not cause auroral glows all over the world, but only in the two belts around the polar regions, as already mentioned. It also explains how the particles can be twisted so far from a direct course as to cause an aurora on the *night* side of the earth—the side turned away from the sun. The whole process is beautifully demonstrated in an experiment devised by the late Professor Birkeland, of the University of Christiania, in which a magnetized iron sphere, representing the earth, is suspended in a glass vessel nearly exhausted of air, and exposed to a discharge of cathode rays. The sphere is coated with a phosphorescent substance, which glows under the discharge in two zones corresponding approximately in position to the auroral belts of the earth. A semicircular disk attached to the sphere and similarly coated shows the path of the discharge in the space adjacent. Prof. Carl Störmer, a later Norwegian investigator, has calculated the paths that the electrified solar particles must follow in approaching the earth, and has constructed models showing these paths, which are exceedingly intricate, varying with the original direction of the particles, the position of the earth, etc. Störmer and his Norwegian associates have also taken a vast number of photographs of the aurora. The pictures are taken simultaneously from two or more stations, several miles apart, connected by telephone, so that the observers can agree upon the feature to be photographed. In the different photographs taken at the same time an auroral streamer, for example, will be differently located with reference to the background of stars, and from a comparison of the pictures its distance and height can be calculated. On one occasion a streamer was thus traced to the enormous height of 470 miles above the earth.



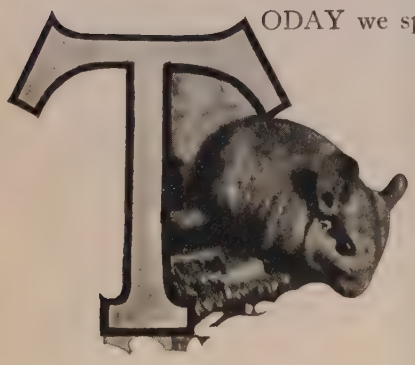
CHINCHILLA THAT IS NOT CHINCHILLA

This is the so-called chinchilla rat whose fur is often sold to gullible buyers as the real thing.

CHINCHILLA—A VANISHING AMERICAN

By Colin Campbell Sanborn

Of the Field Museum of Natural History



CHINCHILLA TO THE *T*

He may hop down into the man's lap below to see his friend.

TODAY we speak of the wild buffalo, passenger pigeon, and other species of mammals and birds as things of the past. For one reason or another, they have lost their place in the order of things and fallen before the crushing advance of our so-called civilization. North America is not the only place where certain creatures of the wild have fought a losing battle against man, for in South America also are found animals and birds that soon will be forced into oblivion.

One of these unfortunates is the chinchilla, far-famed for its soft gray fur. Many know chinchilla fur because it is so scarce and expensive, but few know anything about the little animal whose coat it is. Before the chinchilla becomes just a faded memory it is fitting to tell something about him besides the mere money value of his fur.

The chinchilla (*Chinchilla laniger*) was first described by Molina, the pioneer naturalist of Chile, in 1782, and up to twenty or twenty-five years ago was common in the Andes of Northern Chile and Argentine, and Southern Peru and Bolivia. The chinchillas lived at altitudes of from three thousand to fifteen thousand feet above sea level, where the climate is cold and dry. Their homes were among the rocks and boulders, and they lived upon the bark, branches, and leaves of the low bushes of that region. Coarse mountain grasses also figured in their diet, and the dew that settled upon these plants supplied the drinking water.

Here, then, was their home—many miles from man and his works. They held their own, as Nature intended they should, against the depredations of their natural enemies, the quiques or weasels, foxes, wild cats, and birds of prey. As they were provided with no means of defense against these enemies, their safety lay in flight, and in holes and crevices among the rocks. Nature adapted them to movement over uneven ground by giving them long hind feet and legs for leaping from rock to rock, and a long plumed tail to act as a balance and rudder while sailing through the air. In some hole or cranny under a jumbled pile of boulders, each pair brought forth from one to three young to

A BRIGHT LITTLE CHAP

One of the few left of a vanishing race of small mammals.

CHINCHILLA HAS HIS EARS TWEAKED

As a matter of fact this is the safest place to hold him to prevent his nipping one.

a litter and are supposed to have had two litters a year. Nature also provided them with a thick warm, gray coat, for the mountain winds are cold and piercing, and this same coat has been the cause of their downfall.

When Milady expressed her desire for the chinchilla's fur, Man and his dogs invaded their rocky homesites. The faces of savage dogs peered into their dens and Man brought their worst enemy, the quiqui, whom he had conquered and trained to work for him, to run them out. Where the chinchillas had hitherto found safety beneath overhanging boulders, they now found death in the form of a figure four trap. This persecution was not for a few months in the year, when their coats were the heaviest and thickest, but, once started, it never stopped until only a few shrivelled carcasses were left to mutely speak of what had been.

When the slaughter first began, their skins sold for a peso and a half, or about fifteen cents each, and, even then at that low figure, many fur buyers lost money on the investment. Today, skins are valued at from two hundred and fifty to four hundred pesos, or twenty-five to forty dollars each, depending on the quality. The higher the altitude and the colder and dryer the climate, the better the fur.

At last and inevitably the chinchillas became very scarce. When it was too late, the Chilean government passed a law prohibiting the trapping of chinchillas. In 1924, in North Chile, however, I met a Chinchillero, a man who makes his living by trapping chinchillas, who told me that he caught from one to three a month. He probably exaggerated, but he had caught some and the law seemed to mean nothing to him. There was no one to watch him and enforce the law, so he did not worry about it.

HE TURNS HIS BACK ON US

However, the chinchilla gives us a good look at the softness of his fur.

CHINCHILLAS ONCE ABOUNDED HERE

Elqui Valley in the Province of Coquimbo, Chile, where the little fur-bearer lived.

Next, people began trying to breed them, but to date, and many have tried it, no one has been able to raise them successfully for the fur market. One man in La Serena, Chile, had some chinchillas about six years. He found them hard to mate as they were very quarrelsome, one of their greatest faults. If a female was placed with two or more males, the males fought until one was left to claim the female. The same thing happened when there was a surplus of females and only one male. Sometimes the females that had been living peacefully together, instead of killing each other, killed the male. This, however, could easily be overcome by placing a male and female in a cage with a wire division between them and not allowing them together until they showed positive signs of wanting to mate.

If the young are disturbed, the parents kill and eat them. If young are allowed to run with old ones, other than their parents, the old ones bite off their front paws, and later attack their hind legs. This breeder had to keep all his pairs separate and be very careful about disturbing them when they had young. Feeding them, however, was not difficult. They lived on barley, corn, oats, and fresh green grass. They had no water.

The breeder's place was on the coast where it was damp, so his furs had only a low market value. Chinchillas must have a high, dry and cold climate to produce good furs. Finding a suitable, practical, and yet accessible place for a farm is one of the many difficulties connected with raising them for profit. The fur is valuable only because it is hard to obtain. It is very soft, is spoiled if it gets wet, and never wears more than one season.

Like everything else of value, however, chinchilla fur has its cheap substitute. There is a large mountain rat, *Abrocoma,* living in the same country as the chinchilla, called the mixed chinchilla. The natives believe these light colored rats are crosses between chinchillas and mountain rats, and no arguing, reasoning or scientific explaining can change their views. One species of these rats, *Abrocoma murrayi,* the one from the highest altitudes, has light gray fur almost the same color as the chinchilla. The difference in the animals themselves can be seen in the photographs, but when the feet, head, and tail have been cut off, the fur passes readily enough, with the average person, for real chinchilla. Many people, tourists mostly, have been fleeced by paying ten dollars each for rat skins which could be bought anywhere for ten cents had they noted the difference.

It appears now that the chinchilla is doomed to extinction, for the law cannot protect it and it cannot be raised successfully enough ever to restock even a small portion of the Andes. While it has never been shown that the chinchilla has ever been of any great benefit to man, it certainly has never done him any harm, and it seems a crime that such a pretty, inoffensive creature must pass forever from this earth. Would that we of the northern hemisphere might gain a lesson from this passing of a beautiful and harmless creature, for many of our own animals are in similar danger as a result of man's thoughtless cupidity and killing.

LOUIS PASTEUR

By Erwin F. Smith
U. S. Department of Agriculture

PASTEUR has been dead thirty-one years. In his own lifetime the world united in praising him as few men have been praised, nor was this admiration merely a passing sentiment. Almost alone of the men of his generation his reputation remains untarnished and the glory of it is likely to increase rather than to diminish. His is one of the very greatest names of the nineteenth century, so admitted by every one whose judgment is worth considering. Why is he so great and wherein lies his uniqueness?

One of his masters called him a dull boy, but he had what many a bright boy lacks—an ambition to do fine things and a dogged persistency in following out whatever he undertook. Coupled with these traits, which never left him, was a shrewd understanding of men which was often of great service to him. He married wisely, and he never made any misjudgments in selecting assistants any more than in selecting problems. To these qualities we must add a whole-hearted devotion to the truth; a deep and ever-increasing love of humanity; much good common sense; a keen insight into abstruse phenomena; the desire to bring every hypothesis to the test of exact experiment; and finally a militant spirit, often in evidence.

LOUIS PASTEUR, 1822-1895

If Pasteur had been a mild retiring sort of man he would never have moved the world. Without the fighting spirit he could not have forced his discoveries upon an unwilling generation and revolutionized the practice of medicine and surgery. He was an innovater, a torch-bearer, a discoverer, an explorer of unknown continents of knowledge, the maker of new pathways in half a dozen fields of science; but his greatest title to everlasting remembrance is the fact that his discoveries roused the world from its inertia, and started those lines of research which have led during the last fifty years to the amazing discovery of the causes of most of the communicable diseases, to the development of immunology (use of vaccines, antitoxins, etc.), to the general application of asepsis in surgery and gynecology, to a multitude of important uses in the arts (manufacture of cheese and butter, preservation of foods and drinks), and finally to vast and varied hygienic undertakings for the suppression of disease.

The boy is father of the man, according to a wise old proverb. To understand Pasteur we must certainly look first at the young man and his ways. He appears to have been an unselfish youth, devoted to his home and friends and religious in the best sense of the word. He had a good father and mother whom he never forgot, nor were his sisters long out of mind. He was a studious boy, good rather than brilliant in his studies. His record when he graduated B.L. in Besançon was as follows: "Good in Plutarch (Greek), good in Virgil, good in rhetoric, mediocre in history and geography, good in philosophy, good in French composition and very good in the elements of the sciences." His homesickness when he first went to Paris to study and his fondness for drawing, in which he excelled, are striking early characteristics. Later he won the praise of various masters for his first scientific studies which, they said, gave promise of a distinguished career. So predicted Pouillet, Biot, Sénarmont and Dumas.

Pasteur first came into public notice by certain revolutionary studies on crystals. A little later he became profoundly interested in fermentation—in what makes fruit juices change first into alcohol and then into vinegar, why milk sours, why foods spoil. The study of crystals led him naturally into this new field and that opened up other vistas. He discovered that microscopic organisms are the cause of all the common fermentations. His studies showed him that each fermentation was a separate problem with ramifications in every direction. One led him to oppose the doctrine of spontaneous generations, over which, for a dozen years, great battles were fought in scientific societies and in the journals. Gradually Pasteur perfected his methods and worsted his opponents, but it cannot be said that the matter is absolutely settled even yet, because if life originated on the earth, as we are prone to think, it must have developed in the beginning, whatever the case at present, from what we call inorganic substances. In another direction Pasteur's study of fermentations led him to suspect that similar minute ferments might be the cause of devastating human and animal diseases. The advance of science has been so great in this direction during the last half century that it is almost impossible to put ourselves mentally into the cloud of ignorance and misinformation current everywhere when Pasteur first began his studies. What every schoolboy knows now, even the wisest hardly suspected then.

and as for proofs, such as Pasteur furnished a little later, there were none.

The first diseases he studied, if we exclude those of yeasts, were two diseases of the silkworm. These were so destructive that the entire silkworm industry of France was threatened with extinction. At first he supposed that there was only one disease. Later, to his dismay, he discovered that there were two diseases and that his work must all be done over again with this in mind, but nothing discouraged for long this indomitable man, not even the partial paralysis which occurred at this time and nearly made an end of him. Eventually, he found simple remedies for the diseases and saved the industry. These silkworm studies absorbed all his time for several years and laid the foundation of all his future greatness because they led him definitely away from chemistry into the study of the causes of diseases of man and the domestic animals.

Pasteur was endowed with a tireless energy. He acquired from his father the best thing any father can give to any son, namely, a love for work. No man can hope to amount to much without plenty of well-directed, hard work. It is the saving grace of human life. Next to work the law of service is the highest and most obligatory of all the moral laws and Pasteur was fired with the noble ambition to be of service to mankind. Herein he has left a lesson for all of us. Listen to what Pasteur has said in some of his writings:

To his sisters he wrote: "Work and love each other. When one has learned to work he cannot live without it." . . . "Three things go hand-in-hand: will power, labor, success." . . . "I will work ten years on it [a problem in crystallography] if necessary." . . . "I have the truth on my side. They do not know how to experiment. It is not an easy art." In a moment of dejection he wrote: "I must have been half-mad to undertake such an enterprise." . . . "We must never be satisfied with what we have done." . . . Again on the death of his father: "Your poor grandfather is no more. . . . I have thought all day of the goodness of my father. . . . I owe everything to him." . . . "Do your duty as well as you can and don't worry about the rest." . . . "Three dominating ideas of an unselfish life are God, country and liberty." . . . "Young men . . . live in the serene peace of the laboratories and the libraries." . . . "It is within man's power to rid the world of parasitic diseases, if, as I believe, the doctrine of spontaneous generations is false."

We may very well leave our great man with this sentiment taken from one of his addresses and graven over the entrance to his tomb, and which, translated, reads: "Happy is he who bears in himself a God, an Ideal of Beauty, and who obeys it: Ideal of Art, Ideal of Science, Ideal of Country, Ideal of the truths of the Gospel."

Call of the Catnip

By Ben Hur Lampman

IDENTICAL traits run the gamut of the cat family. Puss before a fire, purring drowsily and peering through slitted eyes at the flame, is little sister to the huge lioness, basking contentedly in the desert sunshine. So it is not in the least strange the Biological Survey men have found that wild felines react to the pleasant spell of catnip as surely and ecstatically as any tame tabby or tom. What strange potency resides in the herb they are unable to say, but so long ago that philologists quarrel over the exact derivation of the term this pungent plant won its prefix. It was evident that Nature had cats in mind when she evolved it.

ALL CATS KNOW THE LURE OF CATNIP

It has been discovered that wild members of the family, as well as the tame tabby, lose their dignity when this herb is found.

Hunters of the Biological Survey have turned this knowledge to cruel though practical purpose. For all wild members of the cat tribe are predatory, and stealthily so, and it behooves man to employ every means to combat their increase. What a stroke of irony it is that the cougar, for example, must at all times yield his life to his irrational fondness for a scent until that moment utterly unfamiliar to him. The odor of valerian root is said to affect cats in much the same manner, but in a popular sense valerian root is relatively unknown, while catnip grows in many gardens.

It may be said without exception that all cats lose their dignity when they discover the delightful herb. As their years come upon them there are cats who cultivate a pontifical air, who walk with conscious majesty, and who are singularly immune to flattery or caress. Such a character, when introduced to the catnip "mouse," is a study in psychology. Within that amazed creature, who had thought all thrills long since catalogued, the poise of conscious maturity contends with a wild and extravagant abandon. The schooled complacency of the feline face is broken, irradiated with reluctant joy—and dignity loses the day. He romps like any kitten, unashamed.

Dame Nature keeps many of her secrets to herself. But in a genial mood she made catnip to grow, and there isn't any secret of the fact that she made it for cats.

STEGOSAURUS, AN ARMORED DINOSAUR

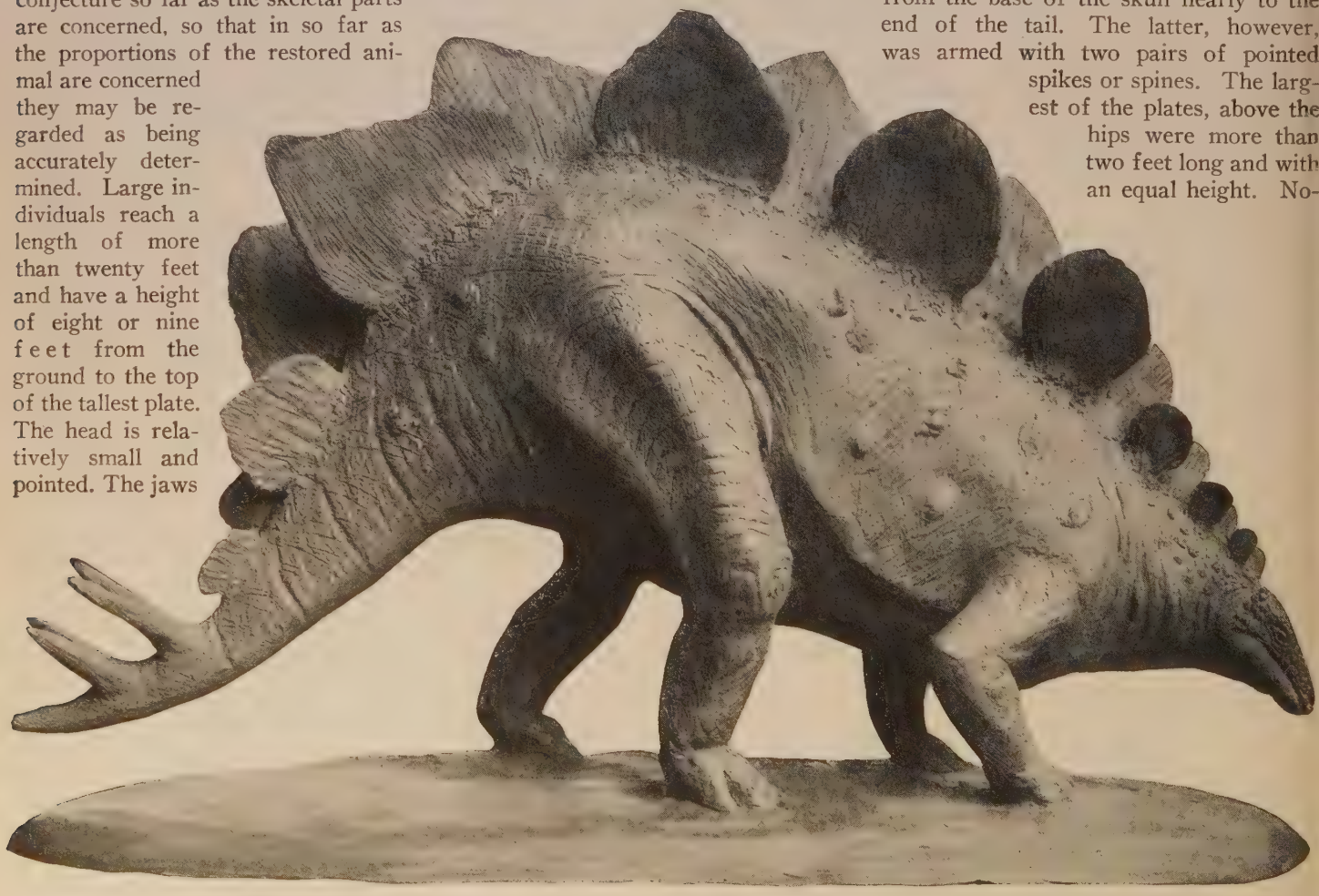
By C. W. Gilmore
Curator of Vertebrate Paleontology, U. S. National Museum

A FEW million years ago America was inhabited by a race of strange reptiles on whom science has bestowed the name of Dinosaurs or terrible lizards. There were a great many different kinds of dinosaurs and they varied much in size, from one no larger than a chicken to those that were more than one hundred feet in length. Some were light and graceful and walked entirely on their hind legs, while others were big and cumbersome and walked on all four feet. Some lived entirely on plants, while others fed only upon flesh. There were dinosaurs with big heads and others with small heads; some had long sharp claws, while others had the toes provided with large hoof-like nails. Some were covered with an armor of bony plates, while others were without such protection.

One of the armored kind, known as *Stegosaurus,* which means plated saurian, is shown here as the animal may have appeared in life many decades ago. This restoration depicts the results obtained by the author after several years study of a large series of specimens. While there is good reason for a difference of opinion in regard to the exact form of the fleshy portions of the animal, little is left to conjecture so far as the skeletal parts are concerned, so that in so far as the proportions of the restored animal are concerned they may be regarded as being accurately determined. Large individuals reach a length of more than twenty feet and have a height of eight or nine feet from the ground to the top of the tallest plate. The head is relatively small and pointed. The jaws are filled with numerous small, weak teeth suitable only for eating the tenderest of plants.

The sluggish, stupid nature of this big extinct reptile seems to be indicated by the incredibly small size of the brain. It has been stated that the smallest human brain compatible with life itself weighs a little over ten ounces; with reasoning powers two pounds; but a cast of the brain cavity of *Stegosaurus* displaces only fifty-six cubic centimeters of water, with an estimated weight of brain of but two and one-half ounces. The most remarkable feature of the nervous system of this animal, however, lies in the great enlargement of the spinal cord in the sacral region between the hips, which has a mass twenty times that of the puny brain. It has been suggested that the movement of the hind limbs and big heavy tail were directed from this center. At best the intelligence of *Stegosaurus* was of the lowest order, probably just sufficient to direct the mere mechanical functions of life.

The skin or dermal armor, which forms such a conspicuous anatomical feature of *Stegosaurus,* is composed of two parallel rows of erect bony plates, that extend along the back from the base of the skull nearly to the end of the tail. The latter, however, was armed with two pairs of pointed spikes or spines. The largest of the plates, above the hips were more than two feet long and with an equal height. No-



A RESTORATION OF STEGOSAURUS

In the language of the street today he would be a "dumb-bell," having an absolute minimum of brain.

where were they more than an inch in thickness except at their bases, which were widened and roughened for the better attachment of the skin in which they were embedded. The upper borders thinned out to a sharp edge. In life these plates were undoubtedly covered by a horny skin, that somewhat increased their size. These plates were strictly skin structures, there being no contact anywhere with the internal skeleton, and in this respect they correspond precisely with the smaller and more or less flattened skin plates to be found on the back of the living crocodile and alligator.

Stegosaurus flourished in considerable numbers, and so far as we now know became extinct in that geological formation known as the Morrison, estimated to have been 10,000,000 or more years ago, indeed it was an ancient beast.

How a Tree Robbed a Bird

By Emanuel Fritz

Associate Professor of Forestry, University of California

THE HEART of a tree may hold many secrets. In the peculiarity of its growth rings, one may learn of past climate and life struggle. There may be recorded the story of an old fire or the attempt of a woodsman to cut it down. Many an insulator pin, horseshoe or spike made fast to a tree has been ultimately covered over and lost with hardly an outward trace.

Not long ago, a Mr. Belknap, sawing up short bolts of redwood into lime barrel staves near Santa Cruz, California, noticed that a certain bolt revealed little insect holes and a seam of decay. The bolt was split open, and within it was a hole crowded full with the acorns of the California black oak.

The hole enters the tree in a radial direction and measures about two and a quarter inches in diameter and about three inches deep. In it were about a dozen acorns. Redwood heals up wounds very quickly, and in this case a ring count shows that approximately twenty-five years elapsed from the time the hole was bored until the tree was cut. When cut, the only external evidence of the mysterious hole was a rounded bump on the surface of the trunk, not much unlike the "bump" frequently found when branch stubs become overgrown and hidden.

TREE REVEALS A HIDDEN SECRET

Cache of nuts stored in a woodpecker hole in a redwood and healed over by the tree.

The hole is unquestionably the work of a member of the woodpecker family, possibly the California woodpecker, and in itself is not so remarkable. But why acorns were found in it is a matter for more conjecture. Who stored these acorns, and why were they not retrieved by the bird that laid them away or by an inquisitive and hungry squirrel? Dr. Joseph Grinnell of the Museum of Vertebrate Zoology, who now has the specimen in this museum at the University of California, offered the suggestion that the hole was abandoned by its maker before it was quite completed for a nesting place, and that each year, as the tree pressed rings or "waves" of new wood over it, the entrance to the hole became smaller. When it was thus much reduced in size a California bluejay, tiring of annoying other birds or with the possible notion of laying up food for a rainy day, decided to fill the cavity with acorns. The hole was probably just large enough to admit an acorn, and once in neither bird nor squirrel could withdraw them without additional carpentry work, for which the jay was not equipped and which was too much trouble for the squirrel. So the acorns remained and the tree finally sealed in the secret storehouse.

This wounded redwood tree reveals the work of insects and fungi following the original injury. First, no doubt, there landed on the sapwood exposed in the hole the spore of a wood-rotting fungus. This fungus stained the wood and rotted some of it. Along came a carpenter ant and, finding the softened wood to his liking, immediately started boring into it. After the acorns were deposited there came also the inevitable weevil and consumed a large portion of the rich interior of each of the acorns but left the shell intact. When the hole was finally overgrown, conditions for the further work of insect and fungus again became unfavorable, and the tree had recovered from one more wound that endangered its existence. Thus do trees preserve the secrets of a tragedy or a frolic over which another generation must needs ponder.

Christmas trees; for which we make our annual call upon our forests, to be sure, glisten their brief moment and are thrown away, but they have served to gladden the holidays for old and young. Properly gathered for the market, these trees do not represent a drain upon our forest resources. Rather do they aid the forest by providing it with the thinning necessary to full growth.

Mr. Charles Lathrop Pack, President of the American Tree Association, holds that "conservation is wise use." He is known throughout the nation as a lover of trees—an ardent conservationist. Yet for the holiday season he urges the use of properly harvested Christmas trees. Foresters are virtually at one in agreement on this view.

The American Nature Association takes a similar stand. It favors Christmas trees for the Yuletide wisely gathered as forest thinnings. It urges the production of trees as a commercial proposition. It actively condemns the felling of fine timber trees to get the crowns and urges all to cooperate in bringing to justice the common thief who filches the Christmas tree from front yard and other private property.

In the accompanying article, Professor Metcalf, of the School of Forestry at the University of California, treats with the Christmas tree issue in its national aspects and adds an interesting suggestion of his own.

WHAT!—NO CHRISTMAS TREES?

By Woodbridge Metcalf
Of the University of California

IN OLDEN times, as Christmas eve drew nigh, the head of the family would bundle the older children into the sleigh, and, taking his axe and rifle, would fare forth to the nearest piece of wildwoods. Here, while the expectant eyes of the youngsters watched his every movement, he would select and cut a trim little evergreen tree to grace the Christmas fireside. If the sleigh were heavy enough, a well-seasoned hardwood log or two often made up part of the load on the homeward trip—these to furnish the crackling blaze beside which the gift-laden tree would stand. If fortune favored, the forest was further called upon for one or more of its furred or feathered inhabitants—deer, rabbit, partridge or turkey—to supply the *pièce de résistance* of the Christmas feast.

Nowadays the woods are so far distant from many of us that we cannot reach them in a day's travel in the swift automobile which has supplanted faithful old Dobbin and the sleigh. Unlovely but efficient radiators have largely displaced the crackling yule-logs as sources of warmth, and the Christmas dinner comes from the corner grocery and meat market. The forward march of civilization has swept away the forest which once spread everywhere between scattered farms and hamlets and offered freely of its treasures to those who would come and take them. It has now withdrawn its leafy cover before advancing agriculture in the valleys and plains to rugged hills and mountain slopes, to swamps of the north or sand plains of the south, areas unsuited to the growing of farm crops. These timbered regions are so far away that most of us must now forego the pleasure of cutting our own Christmas tree from the forest.

The demand for Christmas trees has not declined, however, but has increased in proportion as the population has grown. The use of the little tree with its load of gifts and decorations as the symbol of the good-will spirit of Christmas is of such long standing, and so dear to the hearts of old and young alike, that there are few who would change it except under pressure of the sternest necessity. There is something about the presence of the tree in the home amid all the man-made comforts of the present day, a subtle something in the resinous fragrance it imparts to the air which calls to the spirit of modern man across the years. It is a call from the rude dwellings of his forest-born ancestors to remind him that his love for the forest is deep-seated under the veneer of modern civilization.

So many trees are required to meet the Christmas demand—the number runs into the millions — that carloads lots of spruce and balsam fir from the northeast; Engelmann spruce and white fir from the Rockies; red cedar and pines from the southern region, and Douglas fir and white fir from the Pacific forests are shipped into the large centers of population. It is inevitable that some abuses should accompany this industry. Much thoughtless and unwise cutting is the rule in some sections. Some trespass has been committed, and in many instances trees thirty to forty feet high are cut in order that their symmetrical tops may be used while the balance of their stems is left in the woods to rot. At the distribution centers there is often a large amount of wastage, but this cannot be avoided entirely in the marketing of any perishable commodity for which there is only a brief seasonal demand. Because of this wastage and an exaggerated notion of the influence of Christmas tree cutting on the future supplies of timber for the nation, some well-intentioned but misguided individuals have, in recent years, urged that the cutting of Christmas trees be prohibited by law or at least frowned upon by forward-looking citizens.

The argument is plausible, but shoots wide of the mark. Foresters and others who have been working for years for a comprehensive program of forest conservation realize that the success of the movement for forest protection depends very largely on the development of a very widespread appreciation of the forest in the minds of the American people. There is probably no better way of instilling a love for trees in the hearts of the rising generation than the use of the

little evergreen as a central figure in the Christmas festival.

It is estimated that ten million trees are used each year in the United States for Christmas decorations. These probably range in age from less than ten to upwards of twenty-five years. Assuming an average age of twenty years for these trees—and this is rather high—it would be possible to grow all of them on a block of land eighteen miles square, which is an infinitesimally small area compared to the millions of acres of forest land in the United States. Think for a moment of what such a Christmas tree forest of two hundred thousand acres would look like. It would contain twenty blocks of ten thousand acres each, and on every block would be found ten million trees with a density of one thousand per acre; all the same age. Each Christmas one block would be cut and the trees shipped to ten million American homes. The following spring this block would be reforested with sturdy transplants which would be allowed to grow undisturbed until, at the end of another twenty-year period, their turn would come to bring joy to the hearts of millions of children of the land.

PHOTOGRAPH D. WARREN BOYER

THE CHRISTMAS TREE IS A FRIEND

The idea of a living tree is one that would impress the idea of conservation on the youngsters.

"A large undertaking," you say, "and a very expensive one."

Yes, at the usual planting cost of ten dollars per acre, it would mean an annual expenditure of a hundred thousand dollars for setting out the trees. Add reasonable amounts for interest, taxes, protection and administration of this Christmas tree forest and the yearly expense would be approximately five hundred thousand dollars—or five cents for each tree as it stands ready to be cut. This does not seem an exorbitant price to pay when compared with much larger annual expenditures by the people of this country for things of less intrinsic and sentimental value than Christmas trees. As a matter of

PHOTOGRAPH H. ARMSTRONG ROBERTS

FIRE IS THE REAL MENACE TO OUR FORESTS

Annually an area fifty times that on which enough Christmas trees for the nation could be grown is devastated by fires.

THE CHRISTMAS TREE GLADDENS SUCH MOMENTS AS THESE WHICH WOULD NOT BE WORTH WHILE WITHOUT THE GREEN BEAUTY OF THIS SYMBOL OF THE YULETIDE SEASON

MEXICAN PUMA

From a Dry-point Etching by Benson B. Moore

Mr. Benson B. Moore, author of the etchings on these pages, is a native of the Nation's Capital and a pupil of the Corcoran School of Art. He is represented in the Congressional Library by five dry-points and etchings; in the New York Public Library and many private collections. Mr. Moore is a member of the Society of Washington Artists; Washington Water Color Club; Washington Landscape Club; American Federation of Arts; Art and Archaeology League; Connecticut Academy of Fine Arts; Southern States Art League; New Haven Paint and Clay Club; Rockport Art Association and the Mississippi Art Association.

FEMALE BLACK-CROWNED NIGHT HERON From a Dry-point Etching by Benson B. Moore

PHOTOGRAPH H. ARMSTRONG ROBERTS

THERE IS NO REASON WHY THE CHRISTMAS TREE, PROPERLY GATHERED, SHOULD NOT BE A PART OF THE HOLIDAY SEASON, BUT PROPERTY RIGHTS MUST BE OBSERVED.

fact, the best estimates indicate that last year the Christmas tree bill of the American people was approximately five million dollars. This, of course, is inclusive of cutting, shipping and distribution charges.

If, instead of a single area, we think of our Santa Claus forest as being equally divided among twenty forest-producing states, each would need to have only ten thousand acres growing young conifers in order to produce its share of the necessary annual supply. Costs of administration and protection of such an area would be very small as it could be handled as a small part of the commercial forest land of each state. In reality, all of the Christmas trees that will ever be needed in America can be thinned out of young natural or planted stands of timber and, if properly done, such removal will result in greatly increased growth of the remaining trees. The first requisite for such management, however, is fire prevention and control.

Fire in the forest is the main factor which threatens the continued enjoyment of Christmas trees by the people of America as well as the continued production of all kinds of forest products. During the average year we have fifty thousand fires in our forested areas which burn over a total of about ten million acres. This is fifty times the area estimated as necessary to supply all needed Christmas trees for the future, and, in most cases, every acre which is swept by fire will lie idle for many years before the slow process of natural reproduction takes effect. Repeated fires at frequent intervals have made veritable deserts of over eighty million acres of excellent forest land on which no seed trees are left to supply the nucleus of a new crop of timber. Other millions of acres support only a scattered stand of fire-scarred, diseased or misshapen trees instead of thrifty, rapid-growing young stands of timber that would occupy the ground were it not for fires. The big problem, then, is to stop the spread of fires and see that this great area of potential forest land, now lying idle, is reforested at the earliest possible moment. If this is done, we need have no fear that the supply of Christmas trees will not be equal to the demand. It is a pure business proposition.

PHOTOGRAPH H. ARMSTRONG ROBERTS

CHRISTMAS TREES ARRIVE IN MARKET

Many are shipped long distances to fill the annual demand for them, a demand that is insistent if only seasonal.

Several years ago I became fascinated with the idea that a living Christmas tree is better than a dead one, especially if it can be used for several years in succession. When our little girl was just a few months old I selected a sturdy transplant of incense cedar from the small nursery collection then available and put it in a pot for her first Christmas. It was big enough only for one tiny candle and two or three little ornaments. After two weeks in the house it was set out in the garden, where it grew vigorously the following year. We used it for our Christmas tree for five years, and, as it increased in size, a vase-shaped box decorated with nursery animal pictures was made to contain it. Its annual excursion into the house resulted in the development of a compact, fibrous root system which was easy to fit into the box with a minimum loss of feeding rootlets. Once or twice its branches were scorched by candles but not fatally. After using it the last time the tree was given a permanent place in the yard.

A dozen three-year-old transplants can be secured from a nearby nursery at little expense and set in a corner of the yard in single or double file. This number is suggested as there is usually some loss in transplanting. It will surprise you how rapidly they will grow to a size suitable for Christmas trees if given just a little water and cultivation. If you have room for only one tree, you can secure a potted specimen of larger size and later set it in an advantageous situation in the lawn. When your tree becomes too large to move you can follow the custom which is prevalent in many localities, that of stringing colored lights throughout its branches.

Try growing your own Christmas tree if you have a yard. You will find it an interesting pastime and one which will give you great satisfaction as well as teach all members of the family some facts about growth and development of evergreen seedlings. While there is no reason why every home should not have a tree from the market, if this custom of growing trees for Christmas were adopted generally the personal friendship with one tree should do more to assist the conservation movement than any number of laws prohibiting the cutting of trees from forests for Christmas use.

Here is the fascinating story of Nature's gift of the silkworm, fascinatingly told.

THE SILKWORM AT ITS FACTORY

Twigs of mulberry set upright and on which the busy little worms are spinning their valued cocoons.

Not the least charm is given to this story by the remarkably fine work of Miss Clarke.

SILK AND ITS MAKER

By Otto Wilson

(ILLUSTRATED WITH PHOTOGRAPHIC STUDIES BY CORNELIA CLARKE)

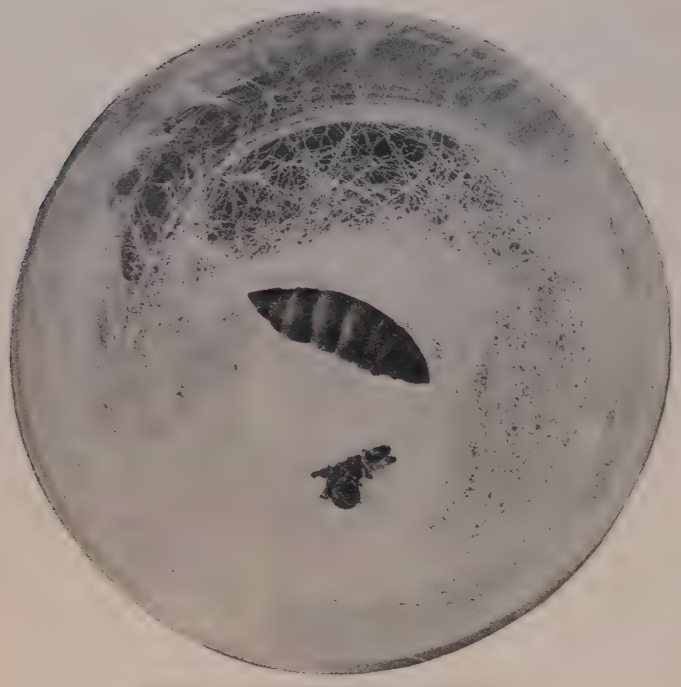
A LOWLY little "worm," delicate, blind, and leading a short, swift life—but it raised one woman to the position of a goddess and has helped millions of others to create an impression of near-divinity. Now that silk has ceased to be the mark of wealth and has almost taken its place among the daily necessities, we may well give a passing thought or two to the humble creature which makes silk possible. Last spring upwards of a thousand of these creatures were hard at work on that dress which you will be proudly wearing next year, and they consecrated their whole lives to the task.

Perhaps the expression "hard at work" is not quite accurate. For the silkworm's chief labor is of the kind that would have delighted the fat boy in "Pickwick Papers"—eating voraciously. Only for two or three days of his short life, while he is weaving his cocoon, does the silkworm really toil. The rest of the time he is either dining or resting.

This little caterpillar is one of the chief domestic animals of humankind. Many occidentals, no doubt, have a vague idea that China is full of mulberry trees and the mulberry trees are full of silkworms, crawling over the leaves as caterpillars do here and weaving their cocoons in the twigs. There are, indeed, such free silkworms in China, but not for thousands of years have the vast army of worms which have supplied the world with most of its silk textiles gone about their work in such unregulated fashion. Instead they have been domesticated until they are much more of an indoor dweller than man himself. Untold generations of sheltered life have made them delicate and sensitive. They are highly susceptible to disease. And the wings of the moth, once it has emerged from its cocoon, are useless for flight, serving only to help it crawl flutteringly about for a few days, very often over a space that might be covered by a man's hat.

From hatching to death all of a silkworm's short life of less than two months is passed not only within four walls and a roof but under the careful scrutiny of human eyes. Only when he wraps his gauzy silken coat about him and lies down to pleasant dreams does he achieve any privacy.

The first faint stirrings of life for the silkworm are felt within an egg no larger than a pinhead. Several hundreds of his brothers and sisters, progeny of the same moth mother, come on the stage about the same time, and around them there are probably many thousand more. So light are the eggs that thirty thousand to forty thousand are required



THE LARVA BECOMES A CHRYSALIS

The chrysalis has a leathery, yellow skin. The cast-off skin is near the new form in the picture.

to make an ounce.

When the softness of spring begins to unfold the mulberry leaves, the silkworm grower raises the temperature of the room in which the eggs are kept, or sometimes simply carries the eggs around in his clothing until they hatch. From each egg in due course comes out the baby worm, a black, hairy little cylinder barely an eighth of an inch long. Ready and waiting he finds his first meal of tender chopped-up mulberry leaves, and he loses no time in drinking down its juicy sap. This is his bottle-milk, from which he quickly graduates to more solid food in the shape of the succulent parts of the leaves themselves.

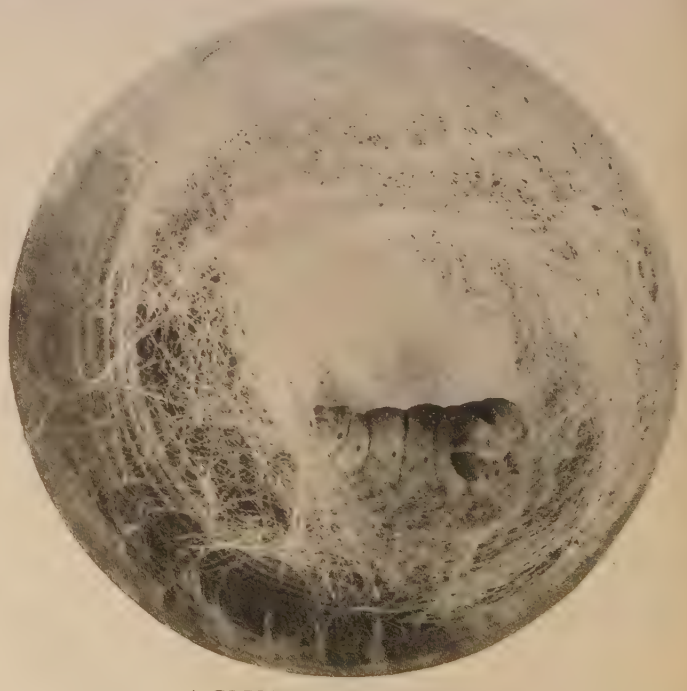
SILKWORMS LOVE TO EAT

Here they are feasting on their favorite mulberry leaves, each consuming about an ounce in all.

Then for a mouth he simply eats and grows. Four times during this period the caterpillar of the most common species outgrows his skin and must stop and remain torpid, with his head held erect and motionless, until he can burst through and leave the outworn skin behind. His fourth molt, coming about twenty-three days after hatching, finds him a caterpillar some three inches long. Then for seven or eight days he consumes food with a vigor that makes all his previous efforts seem languid. His mulberry-leaf requirements during this period are as great as during his whole previous life. With his sharp-edged jaws he saws little semicircles out of the margin of the leaf and holds it with his forefeet while he devours it. Thousands of worms feeding together make a rustling noise which has been likened to the sound of falling rain.

During this, as well as the earlier periods, the attendant has indeed a busy time of it. The food, the trays, even the room itself must be kept scrupulously clean. Good ventilation is a necessity, and the air must be kept free from dust. The temperature must not mount too high, the range being from about sixty-two degrees to seventy-eight degrees Fahrenheit. From five to eight meals a day must be served. When the worms are small, the chopped leaves are spread on pieces of paper in which small holes have been punched, or on netting or similar material, which are placed directly over them. They crawl up through the holes, and the tray or paper on which they have been feeding is removed and burned. In the silkworm room there must be no undue jar or loud noise. So important is silence and quietude that in some parts of China, it is said, caution has grown into a superstition. When a stranger comes to town during the season the silkworm raiser formally announces that fact to his worms, presumably so they will not be disturbed by any unaccustomed sounds; and if a traveler arrives unannounced or makes any noise he is likely to be driven out with curses.

At this time also must the worms be carefully guarded against their chief enemies in the animal world, rats and mice, and this danger has also given rise to superstition. Rodents swarm in Chinese houses, and they dearly love a meal of silkworms. With every feeding season, the silkworm growers go searching for cats, whose mere presence in the room keeps the rats and mice away. Long ago, when cats could not always be obtained, the grower came to try as a substitute life-size pictures of cats, and in many cases they must have proved effective. For presently the picture became a symbol, and in the minds of the growers grew to represent a sort of feline divinity, a protectress of silkworms whose image possessed magical power. The semi-divinity has been given a name, *Ts'an-mao*, or the "cat protecting



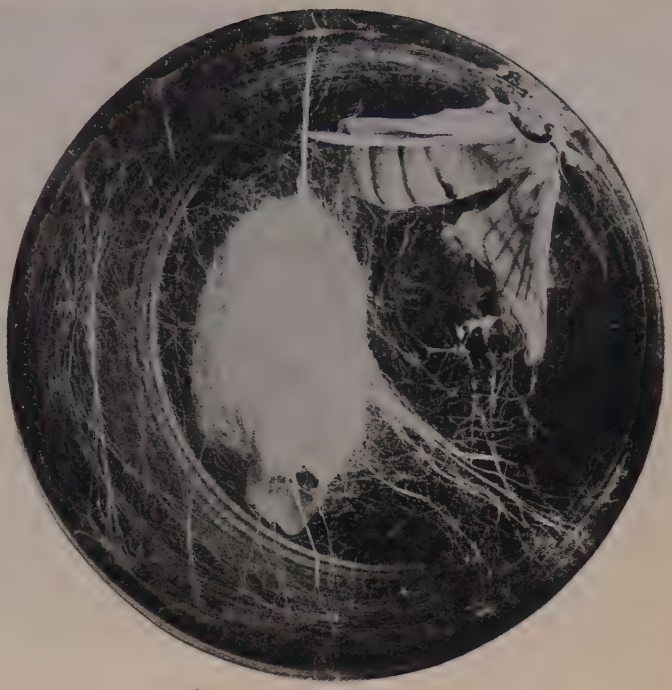
A COCOON IN THE SPINNING

On either side of the body are silk glands from which the silk is spun out in two long threads.

silkworms," and its picture is a familiar one in Chinese manuscripts.

When the silkworm has gorged for a week or so after its final molt the silk glands that run along each side of its body become so full that their pressure stops all further feeding. From that moment to the end of its life the little animal, whether in the shape of worm, chrysalis, or moth, never takes another mouthful of food. Uneasily the worm crawls about and presently begins waving its sightless head in the air, seeking the twigs of a tree. They have been provided for him on a wooden or bamboo frame. When he finds them his head begins to move swiftly back and forth. Here, there, and yonder it goes, and presently a light formless cloud of gauze appears in its branches. The tiny fibers come from an opening in the silkworm's under jaw, through which the fluid from the glands, called fibroin, is squeezed in two threads which immediately unite into one. As it reaches the air the viscous fluid hardens, and a soluble coating of a slightly different substance, sericin, is formed around the thread. So small are these filaments that it takes twelve hundred of them to cover an inch.

Moving in a figure-of-eight motion the tireless head spins out its thread, now in this place and now in that. Soon the spinner's body is surrounded by an ever-thickening curtain. In twenty-four hours or less the body is quite hidden, and within three days the cocoon is finished. Then the worm rests from its labors. The body shortens and presently changes into a white, ovoid mass, bearing little resemblance to the busy worm of the past month. It has a short, thick body, wings and eyes, but no jaws. If left alone it will, in two or three weeks, moisten the end of its cocoon and break through, coming out as a grayish-white moth. A day of breeding and egg-laying follows, then a few days more of crawling aimlessly about without food, and then the little silk-producer's life cycle is over. But for most of them the end comes before the cocoon is broken open. The opening breaks the little silken strands, and except when the moth is preserved to furnish a new supply of eggs it is usually killed by heating or steaming before it comes out.



JUST OUT OF THE COCOON

Female silkworm moth drying her wings. She is about an inch long and of a pale yellow color.

ADULT WORMS ABOUT READY TO SPIN

It takes about thirty days for the worms to attain full growth. They are looking for a place to go to work.

MOTHS THAT HAVE DONE THEIR DUTY

Male and female who have produced their eggs and ended their short span of winged life.

Sometimes the grower kills the worm before it begins to spin, takes out the two glands full of the silk fluid, soaks them in an acid solution until the gland walls can be removed, stretches the contents between two pegs to dry, washes them again and rubs them white.. This is the familiar "silk-gut" which fishermen use to attach their hook to their line. It is very tough and strong and almost transparent in water.

From a single ounce of eggs enough worms emerge to consume, all told, nearly a ton of green mulberry leaves. They furnish to the silkworm grower about one hundred and thirty pounds of cocoons and from these some twelve pounds of reelable silk are obtained. Except for the outer filaments the thread in each cocoon is continuous, and often is more than half a mile long. In a pound of raw silk it is estimated that there are seven hundred and fifty miles of fiber. The number of silkworms which every year supply the world with its demands for silk is almost incalculable. One big American company states that its mills alone use up the fiber from three million cocoons in one average day's work, some seven hundred and fifty thousands miles of silk.

The fiber is obtained by unwinding the cocoons, sometimes by reeling by hand, sometimes by machine "filatures." The light cocoons, after being soaked in boiling water, are floated on the surface of a pan of warm water, and the fibers from a number of them are drawn off together and united into a single strand. This is further strengthened by being twisted, about fourteen turns to the inch, and "doubled" into a thread, and this thread, after it has been cleaned of its gummy substance by "boiling off" and dyed, is ready to be woven into cloth, ribbons, and velvets. Sometimes the strands are twisted sixty or seventy turns to the inch before being doubled, and the resulting thread, when introduced into the weave of a silk fabric, causes the familiar crinkling up seen in a crepe.

COCOON AND THE SILK IT HOLDS

The raw cocoon is stretched between two twigs, around the base of which is a skein of the lustrous silk.

Both the white mulberry, which is the favorite species for silkworm growing, and the silkworm itself, grow well in hot and in temperate climates. The principal silkworm raised for silk is the *Bombyx mori,* but there are many other species, some of which feed on the leaves of oak, osage orange, and other trees.

Far beyond the limits of authentic history and into the mists of mythology must we go to find the earliest mention of the silkworm. In the earliest times of Chinese legendary lore there looms up the figure of Huang-ti, a wise warrior-emperor who gave the Chinese race the compass, the calendar, the coinage of money, and many another useful invention. He had a wife with a name like the song of a bird—Si Ling Chi—and to her he assigned the task of studying the silkworm and its ways and teaching the handling and weaving of silk to his subjects. From that time, about 2640 B.C., a thousand years before Moses lived if Chinese chronology be taken literally, dates the Chinese silk-growing industry. So great was the gratitude of the Chinese for the work of Si Ling Chi that she was deified, and reigns now as the "Goddess of the Silkworms."

For long centuries the Chinese kept their secret to themselves, decreeing death to any who should reveal it. The fine silk fabrics entered freely into trade, especially with the Romans by way of Persia, but their origin remained a mystery to the people of the western world. Some said the silken fibers came from a certain part of the fleece of a sheep. Others thought they were combed from the leaves or the inner bark of a tree, or perhaps from the boll of a plant like the silky strands of the milkweed. In the sixth century A.D. the emperor Justinian solved the problem. He sent two Nestorian monks who had lived as missionaries in China again into that country, and when they returned, years later, they brought in the hollow of their staves the prized eggs of the silkworm. In the shape of those eggs they also carried the whole silk industry of the western world. For the culture spread from Constantinople to Syria and Greece, to north Africa, Spain, and Portugal with the Saracens, to Italy, and about the thirteenth century to France. These Mediterranean regions, with their necessary supply of patient, low-priced, deft-handed labor, are still the only big silk-producing regions outside of the Orient.

COCOONS OF THE SILKWORM

It would take about five thousand of these little pellets to supply enough silk for a single silk kimona.

In England mulberry trees and silkworms will both thrive, but the many attempts which sericulture has made to expand there, have never been perma-

nently successful. America's experience has been marked by a curious persistence of the idea that a big raw-silk industry can be built up here, lasting from the days of the early discoverers to the present moment. In 1522 Cortez, conqueror of Mexico, tried to plant the silk industry there, but after a fair start it faded away. A century later King James I, the original anti-tobacco crusader, tried to supplant the culture of the weed in Virginia by forcing the culture of silkworms and mulberry trees. But a king's power had its limitations even then, and the more profitable tobacco won out. South Carolina, Georgia, Connecticut, and Pennsylvania at various times before the Revolution boasted a flourishing silkworm industry, but in every case it was crowded out by more profitable activities. In 1825 Congress took a hand in the situation, made an investigation, and had six thousand copies of an elaborate report by the Secretary of the Treasury printed. In the late 'thirties a silk-growing boom sprang up, the country became greatly excited, and mulberry slips sold almost for their weight in gold. When this collapsed and a blight in 1844 destroyed most of the mulberry trees, the industry vanished. From time to time since then several states have become interested, including Kansas, Utah, and California, but the high labor costs have always barred the building up of an industry.

But in the making of silk cloth America leads the world. Our raw silk comes largely from Japan, and the gossamer-like fibers, stretching across the Pacific, form the strongest bond which holds the two countries together. The trade is enormous. The value of our purchases of raw silk, in fact, is greater than that of any other article we buy from foreign countries except sugar. The cloth and thread we make from it, chiefly in the States of New York, Pennsylvania, and New Jersey, range between one-quarter and three-quarters of a billion dollars every year in value—no small contribution to our welfare from a delicate, three-inch "worm," and that insect a native of a foreign country in the bargain.

Mouse-Opossums

AMONG the animals peculiar to America are the opossums, belonging to a group otherwise unrepresented here and with many peculiarities. They have descended from forms known in a fossil state in the rocks of both America and Eurasia. Their nearest living allies are the marsupials of the Australian region, the kangaroos and their relatives. Certain peculiarities in their structure and reproductive processes mark them from all other mammals. The young are born in an extremely rudimentary state and at once crawl into the abdominal pouch, or are placed there by the mother. Each attaches itself to a teat from which, without any effort on its part, milk is pumped into its stomach by the muscle of the mammary gland. When several weeks old, they leave the pouch for the outer world and are carried about by the mother, clinging tightly to her fur, as here pictured.

OPOSSUMS OF THE TROPICAL FORESTS

Here we have a family of murine opossums that are found in Central America and northern South America.

There are several groups of opossums, all essentially alike in structure but differing in size and texture of pelage. Among the most interesting are the murine opossums, so called from their general resemblance to mice. The family here illustrated, a mother and her litter of half-grown babies, well show the aptness of their name.

Murine opossums live in the tropical forests in Central America and northern South America. Like all opossums they are omnivorous, taking that which Nature offers in both the animal and vegetable kingdoms, and finding all good. Perhaps this tolerant view accounts in part for their persistence through the long ages, while many animals which were more particular in their diet developed unfavorable structural peculiarities from eating only one kind of food, and passed out of existence.

These little opossums are sometimes brought to the attention of the people of our cities in a peculiar manner. In their native habitats they frequently take refuge by day in bunches of bananas, and in some cases they are transported unnoticed to northern ports. Sooner or latter they are discovered in their hiding places or detected as they search for food among their new surroundings. It is probable that many are mistaken for mice and destroyed by unobservant persons and that otherwise they would more frequently come to the attention of naturalists. Certain species of the group were first made known to science in this way.—E.A.P.

American Nature Association Activities

OWING to a delayed return of the Finley-Church Expedition of the American Nature Association and the tremendous task of getting the material—both photographs and facts—into shape, it was found to be impossible to begin the story of the expedition in this issue. It is hoped that the first article will be ready early in 1927.

* * *

Those actively interested in the work of Nature Study in school organization will find the meeting to be held in Philadelphia, December 27 and 28, of special interest. This is the joint gathering of the American Nature Association and the American Nature Study Society and full details of the program will be found in the Nature Education Department in this issue.

* * *

A most successful meeting of the American Ornithologists' Union was held in Ottawa, Canada, the week of October 11, bringing together many ornithologists from Canada and the United States. The American Nature Association was represented by two members of its staff, R. Bruce Horsfall and Edward A. Preble.

* * *

In connection with the billboard restriction phase of our Outdoors Good Manners campaign we were interested in a pertinent paragraph from *The New Yorker* in which that witty publication observed that "when Queen Marie comes to America she will travel mostly by automobile so that she can get an intimate view of American life and scenery. We must remember to knock off a board and let Her Majesty have a look."

* * *

Members of the American Nature Association must necessarily join in congratulating the Buffalo Society of Natural Sciences on the important event that took place on Saturday, October 16, when the corner-stone of the Buffalo Museum of Science was laid at Humboldt Park, Buffalo. This will be a beautiful building dedicated to the cause of public education in Nature.

* * *

One of our fellow members, Mrs. R. B. Molloy, is president of a small but active Nature Study Club in Corsicana, Texas, organized in 1922. Mrs. H. J. Ellis, another member, is one of the vice-presidents. The club has worked out a well-rounded program for this winter, dividing up the responsibility for planning each of its semi-monthly meetings among the members.

* * *

We are pleased to call attention to an attractive and interesting little pageant entitled *Where Are My Wildflowers?* written by George Bennett, founder and director of The American School of Wild Life Protection at McGregor, Iowa. We receive frequent calls from our members for information as to where they can obtain pageants and little plays which will dramatize various phases of conservation. This pageant is one, and it can be obtained from Mr. Bennett at Iowa City, Iowa, for 25 cents a copy.

* * *

Members of the American Nature Association will join in extending their congratulations to the National Association of Audubon Societies, which signalized a most successful year in the field of bird conservation with its annual meeting late in October.

* * *

One of our fellow-members, Mr. C. J. Buchanan, was elected president of the Nature Study Club of Indiana at its annual meeting and will take office in January.

BY DORMAN H. SMITH

DOLL TN
"ALWAYS RESPECT THE WISHES AND FEELINGS OF OTHERS"
"YEZZIK"
RUB TN
"AND NEVER TAKE THAT WHICH BELONGS TO ANOTHER"
"MOZZIK"
"AND REMEMBER - THE SELFISH URGE TO ALL FOR YOURSELF SPOIT IS VERY, VERY UNBECOMING"
"YEZZIK"
BUT FORGET ABOUT IT IN THE SPRING
WHEE-E-E CAN ANYONE SPARE A DOLLAR AND WE'LL TAKE HOME A CAR LOAD OF FRESH BEAUTIFUL BLOSSOMS
KEEP OUT
COPYRIGHT N. E. A.

THE CARTOON CONTEST

J. N. Darling of the New York Herald-Tribune *(better known to his host of admirers as "Ding"); Dorman H. Smith of the Newspaper Enterprise Association, and C. Kessler have agreed to serve on the American Nature Association's board to select the three best cartoons in* Nature Magazine *Outdoor Good Manners Cartoon Contest announced in the November issue. Arthur Newton Pack, President of the Association, and R. Bruce Horsfall, Art Director of* Nature Magazine, *will complete the board.*

The contest is to bring out the three cartoons best expressing the need of roadside beautification and directed against the various desecrations of Nature's bounties. Three prizes of $50, $30 and $20 will be awarded. The contest will end April 1 and the awards will be announced in the May issue of Nature Magazine. *No entries will be returned unless accompanied by return postage. Cartoons should be sent to*

CARTOONS, NATURE MAGAZINE
1214 Sixteenth Street, N.W., Washington, D. C.

How Adelaide Went to School

By Esther Webb Scott

HOW BRAVE are you?

In an unguarded moment I asked one of my seventh grade Nature Study classes what they would like for an extra lesson. "Snakes!" said a boy near the front of the school. "Snakes!" echoed from the sides and back of the room. I had my answer, but my heart trembled a bit. There was only one thing in Nature that held any terrors for me then, and that was a snake. Sometimes in my dreams I had snake nightmares, and in waking hours I dreaded to meet a live one on Nature Study walks with my classes.

That school knew how I felt, but they stood their ground. "Snakes or nothing" was their slogan, as I tried to reason with them that it was the wrong time of year for snakes and very likely I could not get a live one. That fact did not deter them any; they suggested that I borrow a pet snake. Yes; but who had one? I asked for snakes at all the school buildings I visited that day. At last I thought I had located the owner of one. But when I asked about it, the supposed owner said that he would have been glad to lend me one, but that his snakes had died. His face saddened and his big blue eyes were earnest as he said, "I had to keep them in the cellar, and I am afraid it was too damp for them. People are *so* unsympathetic about my snakes!"

One of my young friends telephoned to all the possible places in the city to locate a snake and at last found where there was one. A pupil from the school that had started me upon this thrilling hunt escorted me to the well-known government institution where one harmless live snake was residing. The custodian was kind enough to lend it for public school use. She demonstrated its gentleness and explained that it was quite harmless, although slightly nervous from skin-shedding. Even the snake's name, Adelaide, had a pleasant and reassuring sound.

Another young friend of mine had joined the group by this time, and the two boys were allowed to hold Adelaide in their hands. They remarked that the teacher had better hold her too, as she was going to have to teach with the snake the next day. Chills went down my back! I could *not* pick that thing up! But finally I did stroke her with one finger while the custodian held her.

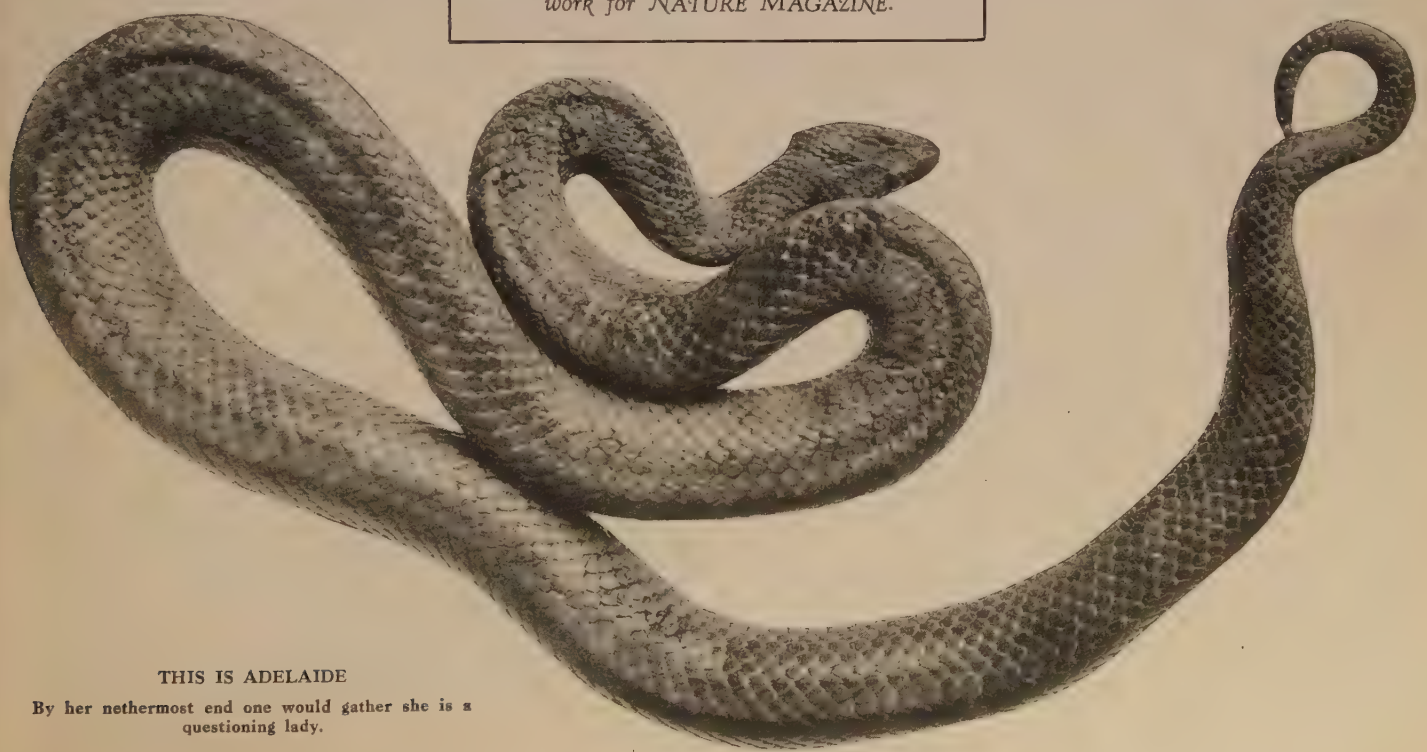
Adelaide was used to a warm place, and the weather out-of-doors was nearly to freezing point. The boys got a rug and an old fur coat out of my little coupé. They wrapped the cage warmly and put it in the car, and Adelaide's scholastic career was begun!

That night I had to keep the snake in my room. To be sure, she was in her cage, and the cover was on tight. I began to get a thrill out of the situation, as I read up on snakes and worked on my lesson plan until after midnight.

The next day, before taking the snake to the school that had specially wanted the lesson, I tried it first on another school. But when I first took Adelaide with my own hands from her cage, even the children knew that I was scared! Every time Adelaide wriggled, she was put back into her box—quickly! One of the boys of the class met me some time later and remarked about it, asking why I was scared, if Adelaide were as harmless as I said she was.

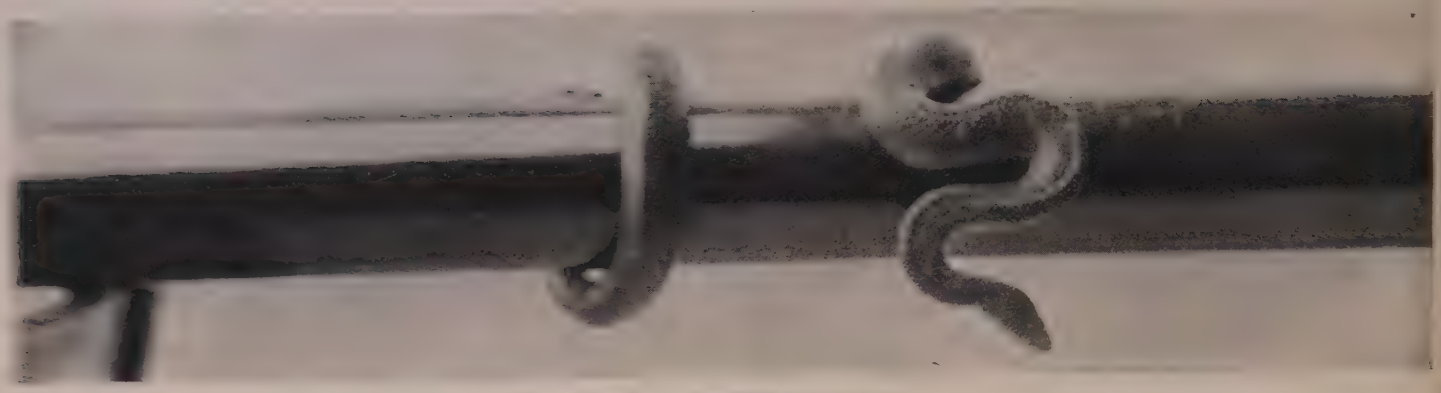
But long before the first lesson

With the advance of Mrs. Elizabeth K. Peeples to a school principalship, Miss Scott, the author of this story, will become supervisor of Nature Study in the Washington, D. C., schools. Miss Scott is a tireless worker and an ardent enthusiast. Mrs. Peeples will, however, retain her Nature Study contacts and her work for NATURE MAGAZINE.



THIS IS ADELAIDE

By her nethermost end one would gather she is a questioning lady.



ADELAIDE MADE HERSELF AT HOME

Met at first with distrust, even fear, she won her way into the confidence and affection of many friends.

laide was found to have no eyelids. So little is known about the food habits of this particular snake that through a period of six months she has not accepted any food which was offered to her. It would have been interesting if the snake would have eaten something there in the classroom; however, the children were told that a snake can eat a bulk of food larger than its own jaw is wide, and then they were able to solve the problem of how that was done by examining the skull of a harmless snake. Adelaide drinks often from her water dish. She did not drink for us in the school, but we have hopes that at another time she may. When Adelaide was put back in her box at the close of the lesson, she wiggled her tail to say "Good-bye," so the children said.

Although the procedure was varied to fit the reactions of the children and of Adelaide, the snake lessons were always carefully introduced and ended. Towards the end of each lesson we spent some time on the study of the poisonous snakes. How does a poisonous snake get its poison into its victim? Ninety-nine out of a hundred children think that a snake's tongue is its poison fang. By the time this part of the lesson was reached, my children knew that a snake's tongue is merely its tongue, and bears no poison, and many of the youngsters considered it an honor to be "licked" by Adelaide. By looking first at the skull of a harmless snake and then at that of a rattler, the children discovered the real fangs.

In the vicinity of Washington there is only one poisonous snake, and that is the copperhead. A dead one preserved in formalin was shown to the children, and one child drew on the blackboard the "hour-glass" markings on the back, by which this deadly reptile can always be recognized. Another thing which the children noted was the triangular head, the swelling back of the eyes being caused by the presence of the poison glands.

It was pointed out to the class that most of the harmless snakes are really very useful, as they feed upon rats and mice which would destroy much valuable property. On the other hand, the children are now able to recognize the one dangerous species found about our city, and they will leave it severely alone if they ever encounter it. These children, listening with such interest to the snake lesson, have lost the needless fear of harmless snakes which makes a country excursion more dreaded than enjoyed.

A month afterward a little fourth grader told how some boys had killed a harmless garter snake. Tears came into his eyes as he said "I could not make them understand."

THIS MONTH'S STORY

TYTO

FOR THE CHILDREN

TYTO FOR SHORT

By MARJORIE SHANAFELT

IF YOU were just about six inches tall from the points of your toes to the tips of your ears, and spectacled men who read fat books said your name was *Speotyto cunicularia hypogea,* you'd want a nickname, too. So we called him Tyto for short.

Tyto never told us how he reached us. All we knew was that when he entered the building one morning he was standing at the end of the long, dark hall. His big, yellow eyes glared up out of the dusk in a startling manner. We advanced cautiously as though the eyes might be those of a mountain lion, or a tiger. Then we found that the eyes belonged to a ridiculous small burrowing owl. He should have been in the hot sandhills where little lizards flip up tiny clouds of sandy dust as they scurry about, where little sand daisies grow as sweetly as though there were no such thing as water included in the diet of a healthy plant, where the bones of animals that lived millions of years ago wait for men who speak big words to come and exclaim over them. Instead here he was, hundreds of miles from a sandhill, sitting so quietly, staring so fixedly, and nobody knew how he had arrived.

Tyto belongs to the triumvirate of which so much has been written and more believed, that is, the prairie dog, the rattlesnake, and the burrowing owl, who are popularly supposed to live in peace and harmony in the same hole. The truth is that the owl moves into the prairie dog's hole when the prairie dog is entirely done with it, and the rattlesnake moves in afterwards and eats up the poor little owl.

At any rate, Tyto had left the triumvirate and sat a-staring in the dark depths of a university hall. He offered no resistance at being picked up. He just looked at the huge being towering over him, and the look said plainly, "Please don't hurt me." Once he was on a level with one's eyes the cut of his clothes could be appreciated. His eyes stood out above a sharply curved beak that was almost hidden in the feathers around it. Just below this beak, or bill, was a dark row of feathers reaching from ear to ear, that looked for all the world like the gaping mouth of one of the terrible gargoyles on the Paris cathedral. Mother Nature gave Tyto that dreadful-looking mouth to scare away enemies who might be considering Tyto for dinner. His vest and trousers were all of a piece like a pair of rompers, and made him look like a little Dutchman. The rompers were very much divided, very full or bloomerlike, and ended at the knees. From there to the ankles his skinny, broomstick legs were covered with short spines. He stood with his toes turned neatly outward, just as young ladies who went to boarding school in grandmother's day were taught to stand. His cutaway coat was a beautiful brown, spotted and dashed with white.

Tyto proved to be a stolid fellow. It took a great deal to ruffle his disposition. There was just one thing we could do to excite him. If any of us approached him with a swaying of the body, a hunching of shoulders, a wagging of head, and a weaving of arms, Tyto was on the defensive. He would lower his head, fluff up all his feathers so that the bloomers were twice as bloomery, and slowly spread his wings. His false mouth seemed to yearn for the moment when he could swallow the intruder at

TYTO ON THE ANGRY DEFENSIVE

One thing that would excite him more than anything else was for one to approach him in a swaying manner.

one bite. He would weave his body in erratic figures. If the danger didn't run away, he began to click his bill. It sounded very dangerous, and we usually pretended to run away. Then he would slowly relax, shake himself a little, and subside into a round bundle of feathers with two gloriously golden eyes. If he accepted anyone as a friend, he would reach out a claw and hook it around that new friend's forefinger. Then he would sit and look up at him as if imprinting his portrait upon his small brain.

Tyto's chief item of diet was mice, but if mice were scarce he could be induced to eat long shoestrings of steak. It took maneuvering to feed him those strings of steak because of the danger of being snipped by the sharp bill when it clicked together over sensitive finger tips. When Tyto had a mouse he went at it quite deliberately, as if he wished to make it last as long as possible. He wouldn't eat while anyone was around, and we had to watch him through the keyhole in order to see his table manners. After placing one foot upon the mouse, Tyto would stand for ten or fifteen minutes serenely gazing about the room at the different objects it contained, as if he had never seen them before. The foot that wasn't holding down the mouse would be held up high, pressed against the front of his rompers. After a time he would put that foot down and transfer the mouse to it. He would look the mouse over most carefully. After satisfying himself in regard to its delicacy, Tyto would put it back on the perch and daintily, with many little clicks of his bill, remove the brain as skillfully as if he were a surgeon performing an operation. He ate as fastidiously as any epicure. After consuming the brain he went right at the business of eating the rest of the mouse. Not even the tail was left.

Tyto was full grown when he came to us, and we didn't wish to keep him long for fear he wouldn't be ready for winter. He stayed with us a couple of months, during which time he kept us very busy hunting mice. He drank no water, for he depended on the moisture in the fresh meat. By the time we thought it best to make him take to the open he had grown accustomed to a life of ease and didn't want to leave. We were beginning to weary of hunting mice and besides, we began to worry for fear there would be no mice for other deserving orphans who might come to us. So we put him out in the yard, expecting to see him fly away without delay, but bless your soul, he didn't do anything of the sort. He looked as though he were saying, "Thank you, but I am quite comfortable where I am." We followed him up and down the hollyhock paths. We slapped out our hands at him, scolded, and stamped our feet, but he would merely hurry a trifle faster. Then after losing him for a moment and thinking that he had flown, we would come upon him leaning against a rock or a grapevine root or something, and he would look at us reproachfully for disturbing him.

TYTO ON HIS GOOD BEHAVIOR

It took a great deal to ruffle his disposition as he proved to be a stolid fellow.

We put on our hats and walked out into the open country with Tyto, thinking it would look inviting. "Away, Tyto," we cried, "can't you remember how good those hot sandhills felt? Can't you just taste one of those delicious kangaroo mice?" But Tyto wasn't a bit disturbed. He stayed right with us and seemed to be enjoying the trip. We were quite in despair and certainly growing tired. We debated what we should do. We just couldn't keep him through the winter in a steam heated building; he would catch cold and die.

At the critical moment a train came whizzing by. Tyto was gazing at us from a fence post, but at the roar of the train he spread his wings, rose into the air, and sailed up into the sky. With never a stop he headed west towards the sandhills. We watched him until he became a speck that was quickly swallowed by the blueness of heaven.

From the air a small brown feather with a fleck of white in it settled leisurely down at our feet. It was a farewell greeting from Tyto, his appreciation of our hospitality.

With this entertaining episode from the life of one Tyto is inaugurated a department of NATURE MAGAZINE *in which each month will appear a story for the children. Every issue, to be sure, appeals both to grownups and youngsters wholly or in major part. In this department, however, there will appear stories selected specially for their appeal to the youngsters. We feel that Miss Shanafelt's story of Tyto represents a fine inaugural article.*

Cassiopeia and December's Skies

By Isabel M. Lewis

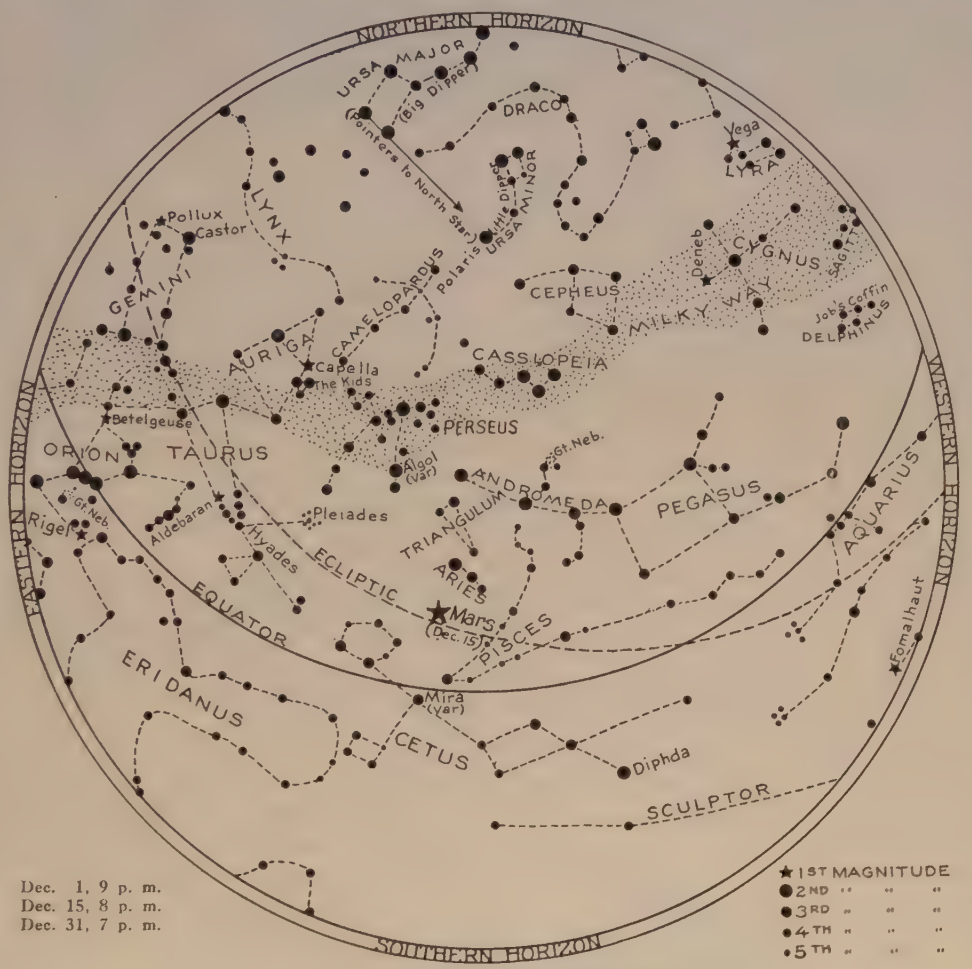
CASSIOPEIA, the Queen, also popularly known as The Lady in the Chair, is on or close to the meridian and high in the northern sky above the pole in the early evening hours of December. This beautiful circumpolar constellation is always easily recognized by its characteristic W and is conspicuous in the northern heavens in the late fall and winter. Then the Big Dipper, which lies directly opposite to it on the other side of the pole, is so close to the northern horizon that it is not seen to the best advantage.

The three brightest stars in the W and a fourth fainter star that forms a four-sided figure with them may be pictured as the seat of a chair, of which the other two stars in the W and a third one above them form a broken back. This chair is not the one, however, in which the queen is supposed to be seated, for it is turned the wrong way. Cassiopeia sits with uplifted arms *facing* the pole, and the three brightest stars in the W, the ones toward the west, are in the breast and body, and the faint star in the prolongation of the W marks one foot.

It may be remembered that Cassiopeia was supposed to be the queen of Ethiopia and was condemned to be bound to a chair and swung ceaselessly around the pole as a punishment for her vanity in comparing herself in beauty with the sea-nymphs. Cepheus, the king, will be found next to Cassiopeia on the west.

It was in Cassiopeia that the most brilliant of all temporary stars, or novas, suddenly flashed forth in the year 1572. For a time this nova was even more brilliant than Venus and could be seen even in daylight. It later became known as Tycho's New Star because it excited his interest so much that he made observations of it and wrote about it, and finally decided to become an astronomer because of the interest in the heavens it had aroused in him. So well, indeed, did he follow his chosen profession that his name is now included in the list of the greatest astronomers of all time because of the care and accuracy with which he observed the positions of the heavenly bodies.

As is the way of novas, Tycho's New Star soon began to fade rapidly in brightness, and in about sixteen months it had disappeared from view. Yet there now exists in the same position a faint, reddish, telescopic star with nebulous flickering light that astronomers believe represents the dying embers of this once famous star. When Tycho's star was at the height of its splendor there was fear all over Europe that it was a sign that some dire catastrophe was about to take place. Some even took it as a sign that the end of the world was at hand! Now it is known that the appearance of novas does, indeed, show that some great celestial catastrophe is taking place, but one so far away in space that it has no effect whatever upon our own sun and its family of planets. Just what the nature of these catastrophies is, or how they are caused, is not yet fully understood. Not so many months ago one of these novas, known as Nova Pictoris, appeared in the southern hemisphere and, after shining for a brief period as a star of the first magnitude, faded away in the usual manner of novas. It will be recalled, also, that in the year 1918 there appeared a magnificent nova in the constellation of Aquila that for a brief time outshone the brilliant Vega.



MAP OF THE SKIES FOR DECEMBER

To use hold over the head with top toward the North.

It is an interesting fact that some of the brightest of these temporary stars have been discovered by amateurs who have had such a good knowledge of the constellations that they were quick to note the appearance of a strange and bright star in the heavens.

Other interesting constellations that are well in view in the evening hours this month are Pegasus and Andromeda, high in the western sky, Perseus close to the meridian in the east

and, next to Perseus on the east, Auriga with its beautiful first magnitude star, Capella. The small triangular group of stars known as The Kids lies close by to the southwest. To the south of Auriga between this constellation and the constellation of Orion, which is now well in view in the southeast, are the two stars that mark the horns of Taurus. Next to the westward we see the fiery Aldebaran in the V of the Hyades, and to the northwest of it a short distance the famous cluster of The Pleiades.

The planet Mars, though noticeably less brilliant than last month when it was at opposition, is still brighter by far than any of the first magnitude stars with the exception of Sirius and, by the end of the month, Canopus. Up to the middle of the month Mars will be brighter than Canopus, which is not visible in high northern latitudes, however. Mars is now in Aries in fine position for observation and will be easily recognized through your telescopes by its deep red color and great brilliancy. On the fifteenth its distance from the earth will be approximately sixty-one million miles. Jupiter is still visible for about two hours after sunset. It will pass through the constellation of Capricornus during the month. It is the only planet now in view that surpasses Mars in brightness, as Venus is still too close to the sun to be seen. Saturn is now in the morning sky in Scorpio. Although too near the sun during the early part of December to be seen, it will be well in view in the southeastern sky before sunrise by the latter part of the month.

CASSIOPEIA—"THE LADY IN THE CHAIR"

This is an interesting constellation visible in December's skies. Try it on your telescopes.

Mercury will reach its greatest distance west of the sun on December 13 and may be seen for a few days before and after this date low in the southeast shortly before sunrise.

Winter will begin this month on the 22nd at 9:34 a. m. Eastern Standard Time when the sun reaches its greatest distance south of the equator and passes through the zenith at all points on the Tropic of Capricorn. It will then be in constellation of Sagittarius.

The "Flying Fox"

By D. C. Retsloff

HOW WOULD you like in the dusk of an Australian evening to have come whizzing out of the darkness of cave, hollow tree or some other shadowy recess, a gigantic bat perhaps twelve inches long, with a wing spread of twenty-four inches, barking meanwhile a queer squeaklike bark? Would you want to catch it and tame it and take it home to have it nibble dried figs and other dainties from the brim of your hat?

The Australian Fruit Bat, or "Flying Fox" as it is sometimes called, in the picture lives about one hundred miles from Melbourne, Australia, and in some way one of his wings had become broken. Joe, a kind-hearted shepherd, rescued it from being trampled beneath the hoofs of a flock of sheep, and set the broken wing. The intelligent bat seemed to realize what was being done for him and rubbed his head against Joe's hand as though in gratitude. Sugar and candy completed Joe's conquest of the crippled bat. It took the bat one week to answer to Joe's whistle, but, if Joe changed his tune to one of a doleful strain, the bat took refuge in the thatched roof until coaxed down with a rollicking air. His greatest delight was nibbling a bit of candied fig tied securely to Joe's hat brim, perched meanwhile on the wide brim of the hat. Joe insists that the bat has brains and uses them in reasoning.

THE AUSTRALIAN FRUIT BAT

With a wing spread, sometimes of twenty-four inches, this bat combines a bark and a habit of destroying fruit.

Nowhere does this bat attain so great a size as in Australia, although they are commonly found in Asia and South America and the islands adjacent to these continents. Like other bats they are nocturnal in their habits and in the night find their way to the orchards, destroying fruit, stripping leaves from the branches, and even peeling the bark from trees. In various parts of Australia a bounty is paid on every one killed.

The fruit bat is clothed in wonderful dark brown fur of the finest quality, has a mouth like a rat with very sharp teeth, and is able with the aid of his very sharp toenails to tear the thickest kind of canvas cloth. He uses his teeth to make a snapping noise when he is annoyed, although his usual vocal utterance is a queer sort of squeaklike bark.

NATURE EDUCATION

Prof. E. Laurence Palmer, Cornell University, Director

ASSOCIATES

Prof. George R. Green, President, American Nature Study Society.

Prof. J. A. Hollinger, President, National Council of Supervisors of Nature Study and Gardening.

Mrs. Elizabeth K. Peeples, of the Washington, D. C., Schools.

Prof. L. D. Wooster, Kansas State Teachers College, Hays, Kansas.

Miss Clelia Paroni, Supervisor of Nature Study, Berkeley, Calif.

Dr. Bertha Chapman Cady, Girl Scouts of America.

Nature Study Meeting

A remarkably well-rounded program has been worked out for the joint meeting of the American Nature Study Society and the American Nature Association which is to be held in Philadelphia, December 27 and 28, in connection with the annual meeting of the American Association for the Advancement of Science. The list of speakers includes names well known in the field of education as well as in the specialized field of Nature education. The complete program is printed elsewhere on this page.

* * *

Forestry Taught in the South

Mississippi has taken an interesting educational step in the appointment of a state forestry supervisor of schools with headquarters at Jackson. The post just created by the Mississippi Legislature has been filled by Mrs. Daisy S. Edgerton, for eighteen years past an employee of the Department of Agriculture, during which time she served for three years in cooperative educational work in forestry with the public schools of Washington, D. C. A forestry exhibit planned and conducted four years ago by Mrs. Edgerton, with the assistance of other members of the U. S. Forest Service and the Nature Corps of the public schools, and visited by hundreds of school children, has been remembered as one of the most effective lessons in forest protection ever taught in the capital city. Later at the request of the Governor of South Carolina Mrs. Edgerton conducted an educational forestry campaign in the schools of that state. Might not other states profitably follow South Carolina and Mississippi?

PROGRAM OF NATURE STUDY MEETING

MONDAY, DECEMBER 27, 9–12 A. M.

"Nature-study in Correlation with Other Subjects," Ethel Hausman, Trenton Normal, Trenton, N. J.
"The Supervising of Nature-study in Large Cities," John A. Hollinger, Supervisor of Nature-study in Pittsburgh, Pa.
"Some New Data on Children's Interests in Nature-study," Emma Davis, Cornell University.
"Nature-study in New York City," Anna Clark, New York Training School for Teachers, New York City.
"Nature-study in Philadelphia," Helen K. Sawyer, Philadelphia School System.
"The Making of the National Educational Association Nature Outline," Mrs. Elizabeth K. Peeples, Washington, D. C., Public School System.

MONDAY AFTERNOON

"The Real Purpose of Nature-study," S. C. Schmucker, West Chester, Pennsylvania State Normal.
"The Beginnings of Nature-study," Daniel Carter Beard, Boy Scouts of America.
"Comments on Nature-study," Liberty Hyde Bailey, President of the American Association for the Advancement of Science.
"Resourcefulness, an Unmeasured Ability," Hanor A. Webb, George Peabody College for Teachers.
"The Future of Nature-study," Anna B. Comstock, Cornell University.

TUESDAY, DECEMBER 28, 9–12 A. M.

"The Humane Society and Nature Education," Guy Richardson, American Humane Society.
"Nature Education From a Mother's Viewpoint," Mrs. Rita Berman, New York City.
"Nature, Culture and the Audubon Societies" (Illustrated). Alden H. Hadley, Audubon Society.
"Nature Education Through Publication," Arthur Newton Pack, President of the American Nature Association.
"Nature in Informal Organizations," Lester Scott, Executive Secretary of the Camp Fire Girls.
"Nature Education in the Museums," Laurence Vail Coleman, Executive Secretary of the American Association of Museums.

TUESDAY AFTERNOON

"Community Nature Programs," William G. Vinal, Syracuse University.
Address of the president of the American Nature Study Society, George R. Green, Penn State College.
Business Meeting.

Nature Work for Boy Scouts

Approximately a thousand Boy Scout executives met at Hot Springs, Arkansas, during the last week of September. Nature work shared honors with camp craft and Indian lore during each afternoon program, and involved work on Nature trails, Nature dens, museums, games, Nature craft, and other forms of Nature activity. The Nature work was under the direction of E. L. Palmer, of American Nature Association, and five assistants of whom one was B. T. B. Hyde, of American Museum of Natural History.

* * *

Child Nature Study Activity

The latest word in elementary education is child activity. No subject lends itself more readily to this modern method of teaching and learning than does Nature Study. In the kindergarten, the first and second grades Nature lessons should be little more than experiences in looking at, playing with, or caring for live material, followed by free expression from the child in any form it may chance to take—a comment, a sketch, a verse, a bit of paper cutting, a game, dramatization, notebook, or best of all outdoor search for the material. As we pass upward in the grades, let the lessons be still the child's—not the teacher's. The questions, the problems, the tasks which arise from his own felt need should constitute the lesson, with the teacher always in the background as guide and counselor when other sources of information fail. Above all, let us remember that a child's experiences must be his own, with actual things, and so far as possible with those things in their natural surroundings.

Some Interesting Things to See in December

By E. Laurence Palmer

OBVIOUSLY, Christmas and the Christmas spirit is the outstanding association made with the month of December. Fortunately, many of the better things about Christmas may profitably be remembered by those interested in looking into Nature's secrets. There are those who get Christmas presents who immediately start searching for the price mark or estimating the relative value of the gift received and the gift given. Similarly there are those interested in Nature who think of the trees, birds and insects only in terms of their value in dollars and cents. There are those who look upon the holiday season as a period in which to indulge themselves in excessive spending, dancing or general hilarity. Similarly there are those who look upon a beauty spot in Nature as a place in which to "cut loose" and in cutting loose they also cut and slash trees, flowers and other forms of Nature indiscriminately. At Christmas, there are always those who question the motives of sincere well wishers. They say, "He did that to make up for some of the dirty things he has done during the year" or "I'm not surprised that his conscience made him 'come through' like that." At all times of the year there are those who question the motives of sincere conservationists and Nature lovers.

THE COLUMBINE

In happy contrast to the types mentioned above, there are those worthy souls to whom Christmas is as it was intended, a sacred season, a season in which they pause from the helter skelter scramble to exist to take time to do those kindly things for others which they wish they might do more frequently could they convince themselves that they had the time. To these people, a Christmas present is not a new camera, a pair of silk socks or a box of candy but an expression of genuine friendliness from the giver. It makes no difference whether the gift is expensive or not if it bears the stamp of being given for the joy it is hoped the gift will bring. We all have received inexpensive gifts that have given us infinitely more satisfaction than other more expensive gifts. And so it is with Nature lovers. From the wild back country to the thickly populated city there are those who can see in a grove of trees much more than a few cords of wood. One of my friends back in the mountains of Idaho once took me down to a spring in his cow pasture. He gave me a look to see if I would understand him and then said this: "One morning I hurt my hand while getting breakfast. I went out and found that my cattle had broken through the fence and that some of my farm tools had been broken. I came down here to cool off and looked at that fir there and that columbine and you know," said he, "I couldn't swear. This was sacred ground." There are those who would call my friend "a nut." There are those who would slight him because at twenty-one he could neither read nor write. There are those whose dignity would be shocked because he insisted upon knowing my first name and calling me by it within a few minutes after I had met him. I feel, however, that my acquaintance with Chris will be one of the best gifts I have received this year of 1926. I would suggest then that for December the readers of this section try, among other things, to look for a few friends with the freshness of vision of Chris, a few friends who will see more than a lumber pile in a tree, who will not look for the price mark on the Christmas gift. Chris refused to sell his home ranch because a pair of eagles nested on it. Many people would hock their most genuine Christmas gift if it did not happen to suit their fancy.

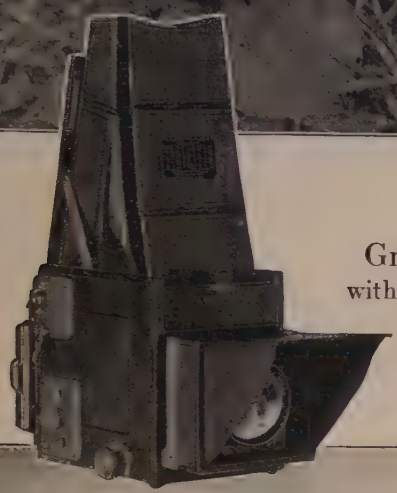
A FEAST OF SUET

It is hardly appropriate to elaborate further in an article of this sort on the desirability of seeking companionship in Nature experience. It may be more consistent with past policy and yet in keeping with the season to suggest a few ways by which Nature lovers may, during the holiday season, show a kindness to the wild life which it gives us so much pleasure to know.

THE EAGLE NESTS

If the bird-feeding station has not been erected get it up so that the winter birds may enjoy their Christmas meal as well as you do. It might be kinder to fasten your suet to the tree or window-frame with string than with wire. Birds have been known to have their eyes frozen to cold wire that was used to fasten suet to trees. This might lead you to the experiment of finding out with a thermometer how cold a piece of barbed-wire fencing for example has to be to freeze to your wet finger. As a child I once tried to lick a door latch on a cold day and froze my tongue to it. I don't suggest that you try this but if you do you

(*Continued on page 370*)



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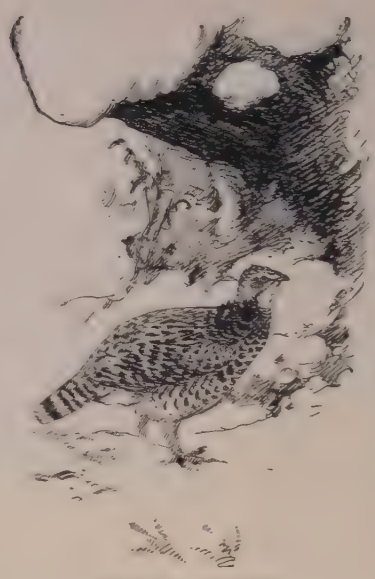
If you'd like to give somebody a Christmas thrill, give him a Graflex.

will not use wire to fasten bird food to trees hereafter.

If deep snows come to your vicinity before the end of the month don't forget to do something for the birds who have to scratch for a living. Some people seem to have the idea that if they put suet on trees they have done all that can be done for birds in the winter. If you follow the trail of a pheasant or grouse through the woods you may find many interesting things concerning the habits of these birds. Do they seem to scratch in deep snow for their food as they do in the dust or do they just peck away at the ground indiscriminately in the hope that they may find food in that manner?



RUFFED GROUSE

Birds are not the only forms of wild life that need help during the winter months. If you are genuinely interested in giving wild life a fair deal do what you can in your community to discourage the use of steel traps by those who trap for furs. In some states there are laws concerning the use of steel traps. What is the situation in your community? There is no justification for causing suffering on the part of dumb animals for the sake of producing luxuries for dumber human beings. If those who wear furs were compelled to do their own trapping there would be fewer furs worn not because of the inability of the flapper to trap but because the average wearer of furs is at heart all right. It is not a case of "What one doesn't know won't hurt" but one causes hurts because one doesn't know. December and the Christmas season will be a good time to investigate the methods by which furs are produced. Furs can be produced as humanely as can beef. It will be interesting to find some way by which you can encourage this practice and discourage the cruel methods more frequently practiced.

SACRIFICED FOR FUR

It may seem to stretch a point to mention being kind to trees but certainly after a heavy snowfall one may combine an hilarious good time with the saving of many trees from injury. The branches of many trees frequently become so laden with ice or with heavy wet snow that they become broken with the first wind. A couple of friends with long poles may have a lot of fun trying to shower each other with snow from the laden trees and at the same time relieve the trees. If you are interested you might try to determine what characteristics those trees have which are best able to resist the effect of heavy snow and ice. Incidentally, don't forget to make the most of your Christmas trees after Christmas day. They may be decorated with food for birds and stuck up in a snow bank or used for constructing a shelter for food for scratching birds or even used to add snap and zest to a fire in the fireplace some evening. A Christmas tree stripped of its glory and dumped on an ash-heap is truly a pathetic-looking object and deserves a better end.

Another good turn which we may do Nature during December is to use substitutes for the usual Christmas greens. The wholesale destruction of holly trees and club-mosses is entirely contrary to the spirit of the season. Of course, if the production of cheap substitutes necessitates hardships for poorly paid human labor it cannot justify itself as against the use of natural material. Whatever the case may be in your region it may be well to understand thoroughly whatever sacrifices may be back of the bit of decoration used for the season. In case you live in a region where club mosses may be used without seriously depleting the supply you may like to look at the slender conelike fruiting bodies. Do the individual units contain single seeds or many small spores? You might find it profitable to look up and find what if any connection ever exists between these bodies and fireworks.

A USEFUL TREE

You may notice during December that the sunsets are less brilliant than they were during the late summer and early fall months but that the stars at night seem to be more brilliant than they then were. It might be profitable for you to try to determine what condition causes these two variations.

Some of you may have the opportunity of observing the northern lights during December and may marvel at the manner in which they sometimes seem to converge in a peak straight overhead. The fact that parallel railroad tracks seem to converge in the distance may help you explain for yourself this behavior of these northern lights.

While looking for these northern lights late in the month it has been rumored that certain individuals have heard the jingle of sleigh bells and a cheery "Merry Christmas to all and to all a good-night." Not a few people will be attempting to find the spirit of Christmas during the month. It is my hope that all readers of this section may succeed in this respect at least.

"—there came a dull explosion above the motor's roar. Startled, I turned to see—"

The stuff that men are made of

A dare-devil aviator dives into the Gulf of Mexico from his speeding plane to save a fallen pilot . . . a quarterback with grit and nerve wins the game in spite of a team that is coached to down him . . . an Indian scout outwits a hostile tribe and escapes from a trap that meant certain death.

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NATURE NEWS AND VIEWS

National Zoo Enriched

Among the many historical, scientific and other riches of the Nation's Capital is the National Zoological Park, which should, by virtue of its position, be preeminent among such institutions. Congressional appropriations have not, however, kept pace with public interest in the Park, and its extension both as to collection and accommodations has been held up. The former phase has been materially assisted by the successful Chrysler-Smithsonian expedition to East Africa, made possible financially by Walter P. Chrysler, the automobile manufacturer, and scientifically by the Smithsonian Institution.

INTERNATIONAL

DR. MANN AND A FRIEND

The director of the National Zoo and one of its new inhabitants.

Under the leadership of Dr. William M. Mann, director of the Park, the expedition gathered more than two thousand specimens, most of which are now installed in the National Zoo. Returning with these new inhabitants for the Park, Dr. Mann is confronted with a serious housing shortage. It has been necessary to split up cages between animals, install the giraffe in one of the bird cages and banish birds and other old inhabitants to parts of the park closed to the public. Congress has before it various measures looking to the improvement of this situation.

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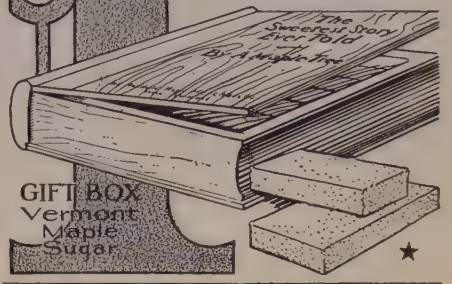

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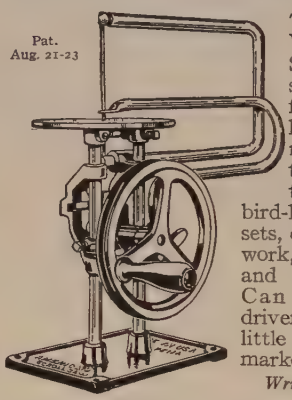

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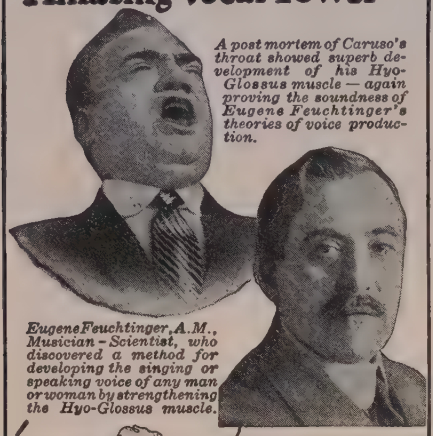
Discovered!

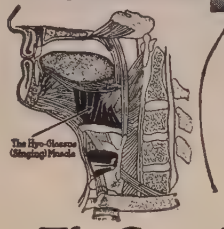
The Scientific Secret of Caruso's

Amazing Vocal Power



A post mortem of Caruso's throat showed superb development of his Hyo-Glossus muscle — again proving the soundness of Eugene Feuchtinger's theories of voice production.

Eugene Feuchtinger, A.M., Musician - Scientist, who discovered a method for developing the singing or speaking voice of any man or woman by strengthening the Hyo-Glossus muscle.



The arrow points to the all - important Hyo-Glossus muscle. Whether your voice is strong or weak, pleasant or unpleasant, harsh or melodious, depends upon the development of that muscle.

The Great Discovery

Professor Feuchtinger, A. M.—famous in the music centers of Europe—discovered the secret of the Hyo-Glossus muscle. He devoted years of his life to scientific research and finally perfected a system of voice training that will develop your Hyo-Glossus muscle by simple, silent exercises right in your own home.

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More Redwoods Saved

Another grove of California Redwoods on the Redwood Highway 250 miles north of San Francisco has just been deeded to the State of California by Mrs. Kate Felton Neilson of San Francisco in memory of her father, the late United States Senator Charles N. Felton. The gift was made through the Save-the-Redwoods League to the State Forestry Board. The tract, which is one of the most beautiful groves in the vicinity of the Dyerville-Bull Creek area, contains approximately 100 acres and over seven million feet of Redwood timber. It occupies a point of land situated in a picturesque bend in the South Fork of the Eel River, an ideal site for a memorial park. It lies across the river from Bolling Grove, another memorial, dedicated several years ago to Colonel Raynal C. Bolling, the first American officer of high rank to fall under fire in the World War.

A Nature Column

Through the interest of one of our members we have had called to our attention a fine Nature column written for the Littleton, New Hampshire, *Courier* by C. T. Bodwell. It is a helpful column, an instructive one and an inspirational one. In one issue it calls attention of its readers to what they will most likely see along the way as they move about in the out-of-doors; gives some excellent advice on preventing forest fires; and provides a remedy for ivy poisoning. The paragraphs are delightfully written and the author and the newspaper are to be complimented on this contribution.

Yellowstone Popular

New high records were established in Yellowstone Park during the 1926 season according to statistics of travel in the park that have been compiled. The past season saw 187,807 persons enter and leave this one national playground, an increase of 22 per cent over 1925, which was the peak year. The visitors who came by rail numbered 40,960, and those by motor, 141,449.

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Falls in Danger

There is now pending before the Federal Power Commission a petition for permit to dam beautiful Cumberland Falls, one of Kentucky's most lovely natural beauties. The Kentucky Hydro-Electric Power Company is seeking the privilege and the National Conference on State Parks urges all those interested in saving this masterpiece of scenery to write to the Federal Power Commission in Washington, D. C., and express themselves.

Experiment Station

The new California Forest Experiment Station is to be located at the University of California, Berkeley. The Secretary of Agriculture gives as his reasons for this selection, central location, and the opportunity that will thus be afforded for close cooperation with the Forest School, the Extension Service, and the benefit of the investigations undertaken by the State Agricultural College and the State Experiment Station, all of which are a part of the University.

Reservation Increased

By Executive Order of October 2, 1926, President Coolidge adds several tracts of marsh and overflow public lands, approximately nine hundred and sixty acres, to the Wild Life Reservation, authorized by Congress two years ago to extend along both sides of the Mississippi River from Rock Island, Illinois, to Wabasha, Minnesota, and increased last year by the addition of all islands included within the reservation formerly withheld. This reservation is administered by the Bureau of Biological Survey in cooperation with the Bureau of Fisheries. It comprises 224 acres in Illinois, 321 acres in Iowa, 146 acres in Minnesota, and 268 acres in Wisconsin.

Museum Gets Fish

Zane Grey, the novelist, has presented to the American Museum of Natural History his collection of mounted big game fish, said to be one of the finest in the world. The fish number about two hundred and have been gathered over a period of many years, the majority of the specimens having been caught by Mr. Grey himself.

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New Bird Refuge

A new federal bird reservation, to be known as the Columbia River Bird Refuge, has been created by President Coolidge on two small islands in the Columbia River, at the mouth of the Walla Walla River, Washington, comprising together about eight and a quarter acres of land. The Biological Survey of the United States Department of Agriculture, under whose jurisdiction the new refuge is placed, has found these rocky islets especially desirable as breeding grounds and safe retreats for wild fowl. From early in winter until the northward migration of wild fowl in the spring, the islands have been for years the favorite daytime resting places for hundreds of wild ducks, especially mallards, and wild geese, as well as for gulls, blue herons, and other species in smaller numbers. The new reservation is not easily accessible to man and already affords water-fowl fairly safe refuge from the fact that the Washington State game law already protects all water-fowl on the Columbia River.

Trumpeter Swans Survive

Not long ago the trumpeter swan came near being listed among the extinct species of North American birds, and while it can hardly be said to be far from the ragged edge of extinction, it does appear to be gaining ground here and there. Edmund J. Sawyer, Park Naturalist at Yellowstone National Park, reports that the swan presumably breeds in the Park, and appears to be increasing there, although only one pair of nesting birds has been found.

Outdoor Good Manners

Vandalism in our National Parks is notably on the decrease so far as Sequoia and General Grant Parks are concerned, at least, reports John R. White, superintendent of these playgrounds. Public education has cut down the number of visitors who feel the urge to carve their initials on rocks and trees and to gather wildflowers by the armfuls. This improved condition makes the instances of thoughtless and deliberate vandalism stand out in relief, and such instances as the visitor who helped himself to a large chunk of the bark of the The Illinois Tree are all the more heinous crimes. These acts are promptly and publicly penalized with excellent educational results.

ASK FOR INFORMATION

Nature Magazine Experts will answer any questions about flowers, shubbery, birds or animals. Write —and ask The Editor.

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Quarantine Extended

New York and Connecticut have been added to the states of New Jersey, Pennsylvania and Delaware on the list of the Japanese Beetle Quarantine administered by the Federal Horticultural Board. Restrictions under the quarantine will affect the infested areas.

Bantams Wanted

We have a request from one of our members, Mrs. Pauline A. Mueller, 3 Delaware Avenue, Belleville, Illinois, for information as to where she can obtain some White Japanese Silkie Bantams. Perhaps some member can make her a suggestion.

Deer in New York

Increase in the number of deer in New York State in sections where there is no open season for shooting and a corresponding decrease in the numbers in other sections is noted by the game protectors of the State Conservation Commission in a recent survey of game conditions in the state. The deer have apparently discovered where they enjoy protection and have deserted those sections where they are hunted.

Annapolis Albino

The little note in the October issue regarding the albino robin of Cincinnati, and the albino muskrat at Loon Lake, Washington, has brought us an interesting letter from Mr. John D. Marston, of Washington, who tells us that in the Murray Hill section of Annapolis, Maryland, there is a well-known albino robin which has been returning each spring for three or four years. Maryland members of the American Nature Association are urged to be on the lookout for this bird next summer and try to secure a photograph of this robin. Another albino which has aroused much interest, this time an albino squirrel, has been spending the summer in solitary exclusiveness in a large cage amid the trees of the Washington Zoo. As though sorry for the prisoner, a tiny bright-eyed chipmunk, native of Rock Creek Park, has made himself very sociable, scurrying in and out of the cage at will, and dining royally on the leavings of his host.

The Forestry Primer

The Forestry Primer is free to members of the American Nature Association. Write to the American Nature Association, 1214 Sixteenth Street N.W., Washington, D. C.

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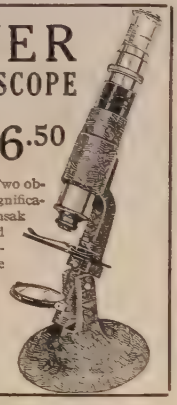

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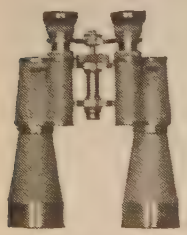

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A Bit of Indian Lore

The October *Yosemite Nature Notes* contains a most interesting article on "Plants Used by Yosemite Indians," by Florence Brubaker, of the Yosemite School of Field Natural History, in which she states the word Yosemite was derived from the word Oohamate which means great grizzly bear. Among other interesting facts about these early Indians was their dependence upon fibers of one sort or another for their thread, milkweed fibers forming their true thread. This was spun or twisted from the inner bark of a species of the *Asclepias* or milkweed by ingeniously suspending a stone to the fiber and whirling it with great rapidity.

The Charmed Squirrel

The New York *Christian Advocate* tells a very pretty little incident regarding Dr. Eben S. Johnson, Bishop of the Methodist Episcopal Church, Capetown, South Africa, who has been spending the summer in the United States. Dr. Johnson was delivering an evening sermon about Africa, in Madison, South Dakota. The choir had vacated the choir loft in order better to hear the sermon. A rustle behind him in the empty choir loft came to the bishop's ears, and suddenly something softly alighted on his left shoulder. Dr. Johnson, without a break in his discourse, put his hand to his shoulder and gently took the little soft-furred squirrel between his hands, telling his hearers that this tiny creature reminded him of the blue-faced monkey of Africa. The shy little visitor seemed utterly unafraid, and in commenting upon the incident the reverend bishop suggested that it was one of those unexplainable mysteries that makes life beautiful and livable. It is our thought that the tiny bit of wild life sensed the gentleness and safety of the hand that held it captive.

Fight for the Chestnut

Against the devastating attack of the chestnut blight on our valuable native trees, little progress has been made in direct combat. So essential is this tree, however, that an important flanking movement has been attempted in the form of seeking blight-immune trees either through importation or breeding. The United States Department of Agriculture has available a Department Circular 383-C giving data up to date and this is available to all those joining in the battle.

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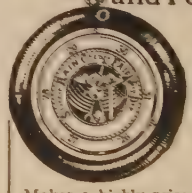

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An Interesting Review

An interesting and attractive pamphlet comes from the Department of the Interior, entitled "Then and Now," a review of the work of the Interior Department for the three-year period, 1923–1926, giving a comparative summary of the changes effected in the interest of economy and better administration. Facts and statistics are presented in a manner far different from the usual dry-as-dust governmental reports, and the review is in itself an indication of the improvement claimed.

A Nature Puzzle

By Gertrude G. Blaisdell

The following Nature Puzzle conceals a slogan of two words. The answer will be published in the January issue of NATURE MAGAZINE.

My first is in man but is not in gorilla,
My second appears twice in friend caterpillar,
My third is in turkey with proud spreading tail,
My fourth is in slug but it is not in snail.
My fifth is in rooster but is not in hen,
My sixth is in butterfly, 'tis also in wren.
My seventh's in salamander but is not in mole,
My eighth is in cat that's sometimes called "pole."
My ninth's in giraffe with his head in the trees,
My tenth is in wasps, but it is not in bees.
My eleventh you'll find in buzzard—grim bird,
My twelfth is in katydid, whose "song" you've heard.
My thirteenth's somewhere in the word kangaroo,
My fourteenth's in meow, but not in moo moo.
And all of the above, I'm sure you'll agree
Are only a *hint* of all that's in me.
But a letter from each named in the above
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Answer to November Puzzle

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Questions and Answers

The American Nature Association will be glad to answer each month such questions as its members ask about Nature.

QUESTION: *Could you please tell me what I could find the caterpillars of the following butterflies on:* Peacock, *Satyrus pegala, Papilio asterias, Pyrameis atalanta,* Monarch (*Anosia plexippus*)?—J. F.

ANSWER: The caterpillars of the butter-

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flies you name prefer food plants as indicated: Peacock, plantain and certain everlastings; *Satyrus pegala,* various grasses; *Papilio asterias,* parsley and carrots; *Pyrameis atalanta,* nettles and hops; Monarch (*Anosia plexippus*) milkweed.

QUESTION: *In the name "Brewer Blackbird," who was Brewer?*—J. E.

ANSWER: Brewer blackbird was named for Thomas Mayo Brewer, an ornithologist who wrote extensively on habits of birds, collaborating with Baird and Ridgway in an elaborate work on North American birds. He died about 1880.

QUESTION: *Could you tell me if red nightshade berries are good to eat? I live on an island in the St. Lawrence River in summer and there are lots of nightshade berries that look like little tomatoes. The blossoms are purple.*—A. H. R.

ANSWER: We would advise against eating the berries of the red nightshade. See note in Nature News and Views, page 129 of the September NATURE MAGAZINE, regarding this.

QUESTION: *I have a five-lined skink. Can you tell me how to care for it?*—C. E. S.

ANSWER: This lizard lives on ants, caterpillars, grasshoppers and probably a great variety of insects. It should be kept in a dry place. It should make an interesting pet.

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Helpful References

Requests for citation of authoritative general works on various branches of Natural History are frequently received from our readers. The following list includes some of the best in their respective fields. Some are out of print and obtainable only through libraries or dealers.

Insects and Other Invertebra

THE LIFE OF THE BEE. By Maurice Maeterlinck (Translation). Dodd, Mead & Co., New York, 1921.

THE SPIDER BOOK. By John Henry Comstock. Doubleday, Page & Co., Garden City, New York, 1912.

A MANUAL OF THE COMMON INVERTEBRATE ANIMALS, EXCLUSIVE OF INSECTS. By Henry S. Pratt. A. C. McClurg and Co., 1916.

THE LIFE OF INLAND WATERS. By J. G. Needham and J. T. Lloyd. Comstock Publishing Co., Ithaca, New York, 1916. 438 pages. $3.

THE SHELL BOOK. By Julia E. Rogers. Doubleday, Page & Co., Garden City, New York, 1913.

THE HOME AQUARIUM, A Guide to the Fishes, other animals, and plants. By Eugene Smith. E. P. Dutton Co., New York.

THE SEA BEACH AT EBB-TIDE (Seaweeds and lower animal life). By Augusta F. Arnold. Illustrated. The Century Co., New York, 1903.

Botany

THE LIVING PLANT; a description and interpretation of its function and structure. By W. F. Ganong. Henry Holt and Co., New York, 1913. $2.50.

AN ILLUSTRATED FLORA OF THE NORTHERN UNITED STATES AND CANADA. By N. L. Britton and Addison Brown. Charles Scribner's Sons, New York. 3 vols., 1896 and later editions.

NEW MANUAL OF BOTANY. By Asa Gray. (New ed. revised by Robinson and Fernald.) American Book Co., New York, 1908. 926 pages.

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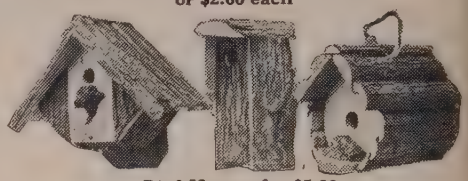

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Darien, Conn.

NEW MANUAL OF BOTANY OF THE CENTRAL ROCKY MOUNTAINS. By J. M. Coulter and Owen Nelson. American Book Co., New York, 1909. 646 pages.

NATURE'S GARDEN: OUR WILD FLOWERS AND THEIR INSECT VISITORS. By Neltje Blanchan. Grosset and Dunlap, New York. 415 pages.

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TAMING THE WILDINGS (culture of wild flowers). By Herbert Durand. G. P. Putnam's Sons, New York, 1923. 380 pages. $3.50.

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THE EVOLUTION OF THE EARTH AND ITS INHABITANTS. By R. S. Lull and others. Yale Univ. Press, New Haven, Conn., 1918. 208 pages. $3.

CLIMATE CONSIDERED ESPECIALLY IN RELATION TO MAN. By R. deC. Ward. G. P. Putnam's Sons, New York, 1918. 380 pages. $2.50.

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HOME TAXIDERMY FOR PLEASURE AND PROFIT. By A. B. Farnham. A. R. Harding, Columbus, Ohio, 1916. $1.

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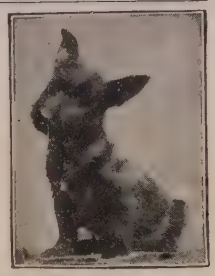

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Index to Nature Magazine

Volume Eight, July-December, 1926

(*Gen.* indicates a general article; *illus.*, a photograph or drawing; *rev.*, a review)

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OHIO WOMEN'S CLUBS PLANTING TREES

Junior Forestry Clubs Being Organized in Wisconsin Where Teachers Study Primer

THE TREE planter needs no object lesson, for he knows, so this statement is for him who does not know. Planted on a gravel bank in Delaware County, N. Y., in 1909, half an acre of trees were the joke of the countryside. Today the trees are thirty feet high, the owner has multiplied his original plantation by thirty-seven, and the whole county is interested in making profitable use of such land as is not suited to growing agricultural crops by planting forest trees. In 1909, John Adams was bothered by stones rolling down into the road. He asked Clifford R. Pettis, superintendent of state forests, if anything could be done. Pettis suggested planting Scotch pines. Since that time planting in Delaware County has increased greatly due to the lesson provided by Adams.

The forestry message is spreading over the world. To further it in Italy, the Forestry Primer, published to mark 1926, the semicentennial of forestry in the United States, has been translated into the Italian and published in "Il Bosco" by the Corporazione Forestale Italiana. The letter to Charles Lathrop Pack, president of the American Tree Association, telling the use of the text, follows:

"I have the pleasure to tell you we have sent to you at 1214 16th Street N. W., Washington, D. C., 2,000 copies of the paper 'Il Bosco' with the translation of 'The Forestry Primer.'

"It is a special number that the Corporazione Forestale Italiana has destined for propaganda between Italians in our land and for those that are living in the United States. Alberto Cotta."

The Primer will be sent to anyone who wants to read in plain phrases the forestry situation in the United States. Any tree planter can have tree-planting suggestions and an application blank for membership in the tree-planting army by asking for them.

Ohio club women have a state-wide tree-planting and forestry educational drive under way that started with the District Conference at Mansfield. Mrs. W. W. Milar, Akron, of the Department of Applied Education of the General Federation of Women's Clubs, has worked out a plan of cooperation with the American Tree Association. At the direction of Mrs. George McDonald at Wyoming, the chairman of Forestry, Parks and Highways for Ohio, a tree-planting contest between the clubs is under way. All the tree planters will thus join the Association and have their trees registered on the Association's National Honor Roll. For the District Conference Mrs. R. Keller of Attica, the district chairman of Conservation, distributed Forestry Primers and the application blanks for membership. In addition, quantities of Forestry Primers and other bulletins have been sent to these chairmen: Mrs. Helen Garnhart, Mrs. Merritt Mason, Mrs. E. S. Braithwaite, Miss Cora Darling, Mrs. A. A. Sanders, Mrs. E. E. Jacobs, Mrs. E. Fleddeythann, Mrs. R. G. Kleckner, Mrs. Flossie Washburn, Mrs. Lena Richards, Miss Ida Roth, Mrs. H. N. Stone.

Two thousand of the seventh edition of Forestry Primers were distributed to the Wisconsin teachers in session in Milwaukee in November. Distribution was directed by H. I. Parmley, chairman of the Faculty Conservation Committee of the Boys' Technical High School, whose students have planted thousands of trees. Wisconsin women's clubs were the first to hold a series of conservation meetings. Mrs. Walter Bowman is conducting the fine campaign through her chairmen, Mrs. E. C. Topping, Mrs. A. E. Rhyme, Mrs. D. D. Emerson, Mrs. Wm. Oldenberg, Mrs. W. D. Brooks, Mrs. Christine Edie, Mrs. C. D. Feathers, Mrs. Fred Rogers, Mrs. J. H. Somerville.

Why not try this in your state? Farmers in Wisconsin are gradually becoming interested in a new crop for the 12,000,000 idle acres in the northern half of the state, and farm boys in the northern counties are being organized into junior forest rangers. Tree-planting demonstrations were held in sixteen counties under the direction of F. G. Wilson, extension forester.

If reforestation is to be carried on steadily, youth must be interested in it; boys' clubs are being organized for junior reforestation under the leadership of the boys' and girls' club work department at the state department of agriculture. Work is divided into orders and any boy between the age of fourteen and twenty may become a member. Clubs are to be organized in localities where five or more boys wish to undertake the work. The first order is that of the forest crafter, in which the boy must learn to identify trees and become thoroughly familiar with forest practices.

In the second order, the boy must be a planter and gain actual experience in planting trees. He must also be a forest protector and cooperate with the forest fire fighters in the state. To join the third order, the boy becomes a woodsman, and when he joins the fourth order he becomes a cruiser. Mr. Wilson believes that this junior forest ranger club work will be productive of much good in the state.

TWO STATES VOTE TAX LAWS

California and Louisiana voted at the November election to amend their state constitutions so that forest taxation laws may be passed.

The principle of a nominal tax on land devoted to forest tree growing until such time as the timber is to be cut is incorporated in both states' plans.

"These forward steps in forestry legislation," says Charles Lathrop Pack, president of the American Tree Association, "will have a heartening effect on other states, particularly Pennsylvania, where a bond issue for reforestation will be passed upon by the voters in 1928."

The vote for the amendment was decisive in the two states, but in Washington a similar proposition was defeated.

Col. Henry W. Shoemaker celebrated Arbor Day by planting six descendants of the famous Charter Oak in front of his home, "Restless Oaks," at McElhattan, Pa. These trees will be known as Sesquicentennial Oaks. These will be splendid additions to the other historic trees planted at "Restless Oaks." A row of native sugar maples was set out by Colonel Shoemaker's grandparents to celebrate the centennial of 1876. They have now reached goodly proportions and are in a vigorous condition. Centennial trees were planted in large numbers in central Pennsylvania, especially in Clinton, Cameron, Potter, and Tioga counties.

In Independence Square, Philadelphia, thirteen American trees were planted as a living memorial to the Thirteen Original States in the Union. Among the participants were Gen. John R. McQuigg, national commander of the American Legion; Major U. S. Grant, Mayor W. Freeland Kendrick of Philadelphia, Rev. Thomas J. Garland, Protestant Episcopal Bishop of Pennsylvania; Congressman Martin L. Davey of Ohio, Mrs. Alfred J. Brosseau, president-general of the Daughters of the American Revolution, and national officers of several other patriotic organizations. The presentation of the trees was made by Congressman Davey. Mrs. J. Willis Martin, chairman of the Women's Sesquicentennial Board, was in general charge of the event. Mrs. Alexander Ennis Patton of Philadelphia was chairman of the committee in charge of the program.

At Forest Vale Camp, Franklin, N. H., the following joined the tree-planting army: Ruth Brush, Mary Jane Curtis, Lois A. Gaw, Charlotte Gulliver, Madelein Hartshorn, Marion Hartshorn, Anita Hillhouse, Norma Jones, Betsy Lindsley, Doris McCulloch, Helen McCulloch, Crystal Merrow, Virginia Teller, Dorothy Wilson, Alice Vanhoesen, Martha Vanhoesen, Mary Burghardt, Marion Larkin, Adelheid Schneider.

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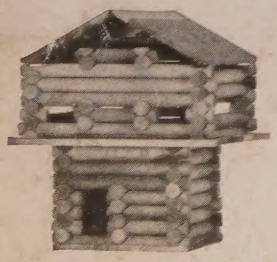

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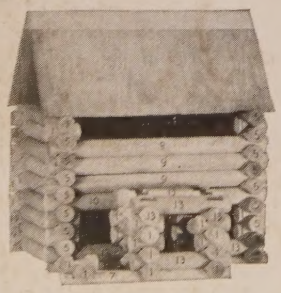

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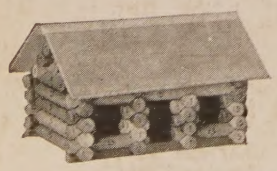

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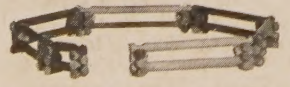

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